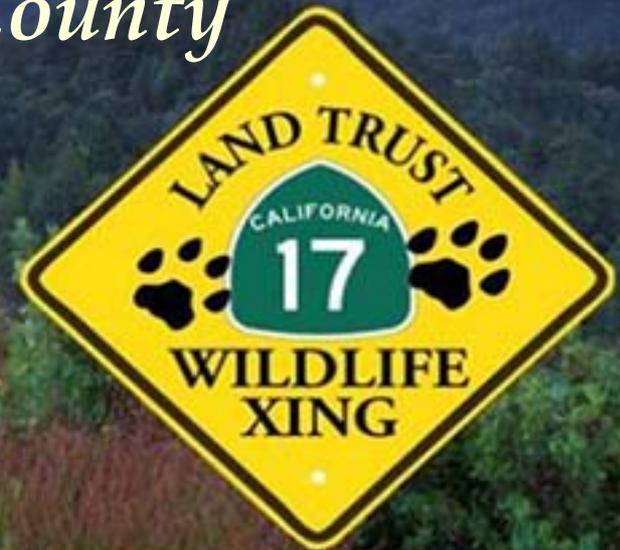


# Case Study: Highway 17 Connectivity Project

## *Promoting Habitat Connectivity in Santa Clara & Santa Cruz County*

Pathways for Wildlife: Tanya Diamond & Ahiga Snyder  
Caltrans District 5: Nancy Siepel and Morgan Robertson  
9/30/2015 Caltrans Road Ecology Meeting





- Central Coast of California
- Highway 17
- Between Santa Cruz in Santa Cruz CO. and Los Gatos in Santa Clara CO.

# Purpose and Need

- Highway 17 is a four-lane expressway that bisects the Santa Cruz Mountains
- High traffic volumes (57,000 vehicles per day)
- Concrete median barriers
- Inadequate culvert or bridge under crossings

The highway contributes to habitat fragmentation in a region identified as an important wildlife habitat linkage corridor for mountain lions and other wildlife



# Animal-Vehicle Collisions on Highway 17



# Effects of Habitat Fragmentation on Wildlife

Fragmented habitat makes it more difficult for wildlife to maintain home ranges and territories that---

- Provide adequate food and water
- Allow large enough territories to find mates and home ranges to raise young
- Allow juveniles to disperse out of their parental home ranges to establish their own territories



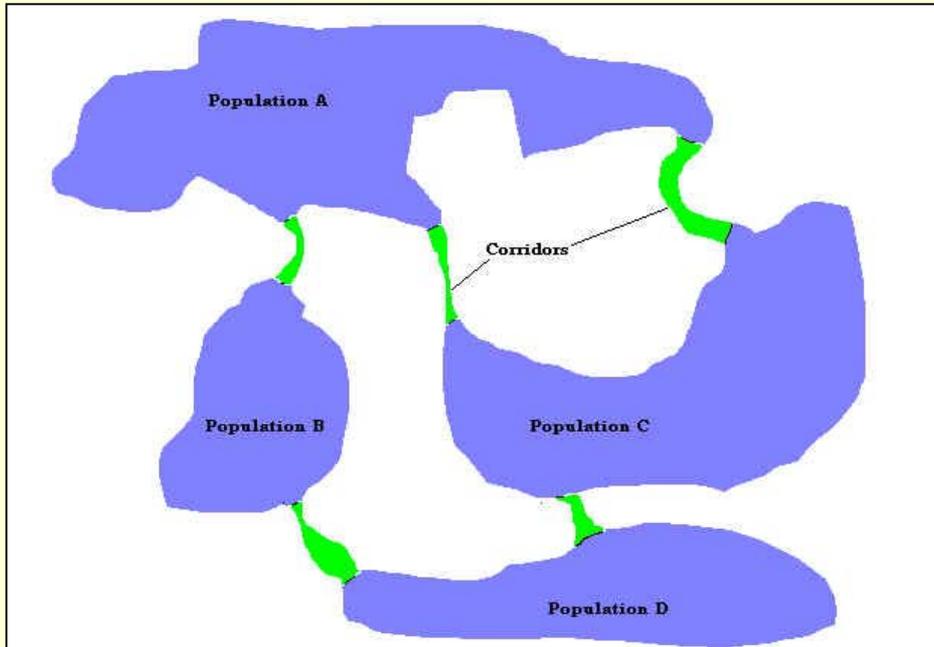
Hwy 101 Bobcat Family-TNC Data



Bobcat using a Culvert at Hwy 152

# Wildlife Habitat Linkage Corridors

- Many species have large home ranges and are wide ranging species. For example, the male mountain lions in the Santa Cruz Mountains have a home range up to 160 km<sup>2</sup> (UCSC Puma Project).



Example Habitat Linkage Corridors



Hwy 17 at Laurel Curve - Pathways for Wildlife

- Linkages provide travel routes and habitat for species to immigrate (ex. males searching for mates) and emigrate (ex. juvenile dispersal) within their metapopulation (McCullough 1996).

# Regional Mountain Lion Genetics

- The Santa Cruz Mountain lion population already has low genetic diversity (Chris Wilmers UCSC Puma Project, pers. comm.).
- Central Coast mountain lions are lacking 2 gene types compared to other populations in the state, this further threatens the mountain lion populations in the Santa Cruz Mountains.



Land Trust of Santa Cruz County: Star Creek Ranch Mountain lions



# Wildlife Studies Highway 17 Corridor

- In 2011/2012 Midpeninsula Regional Open Space District, Peninsula Open Space Trust and the Land Trust of Santa Cruz County hired Pathways for Wildlife to conduct wildlife studies on Highway 17 in Santa Clara and Santa Cruz Counties.
- Purpose is to identify the best locations to improve or construct wildlife undercrossings in core habitat linkages identified in several landscape-scale wildlife connectivity modeling efforts.
- Studies include:
  - ❖ Collecting and collating existing roadkill data
  - ❖ Wildlife camera monitoring



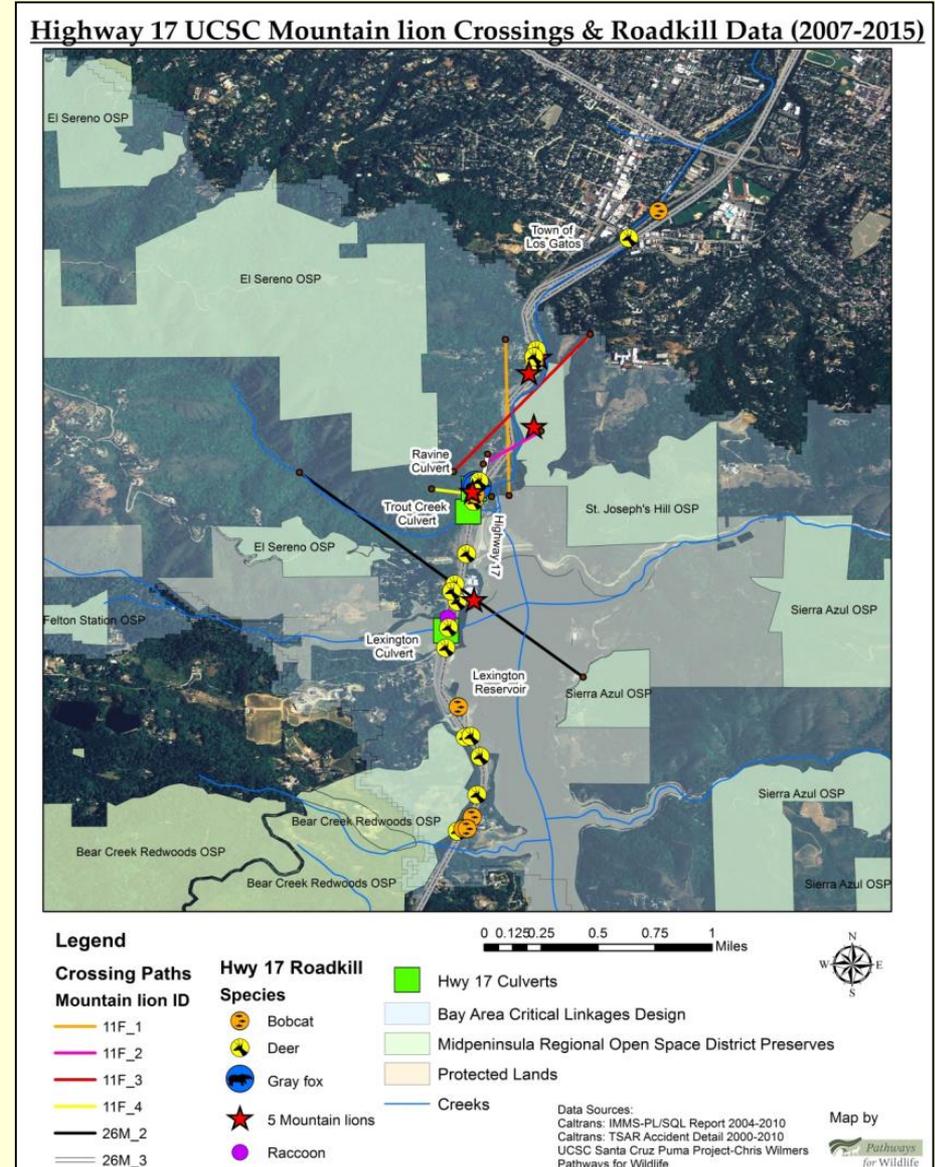
# Study Sites: Lexington Reservoir & Laurel Curve



# Study Site 1: Lexington Study Area

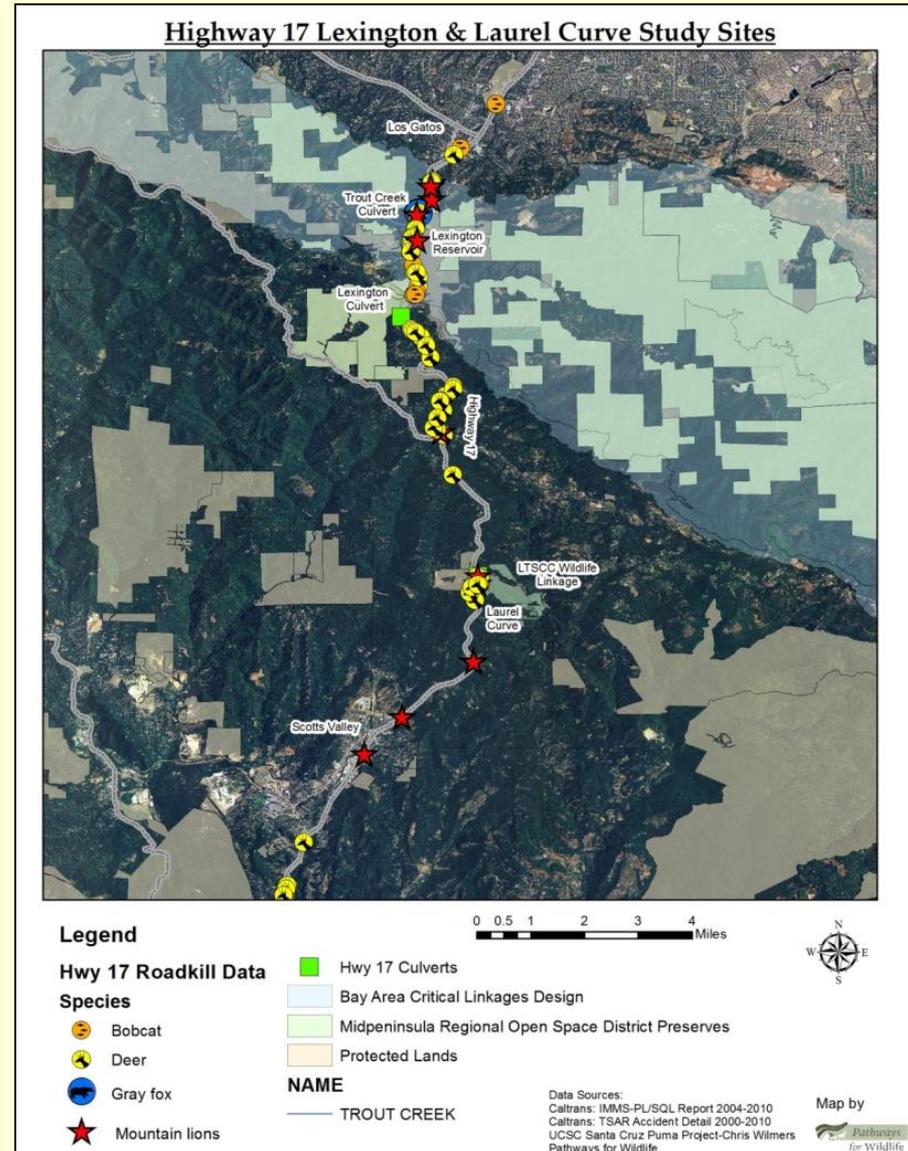
## GPS Telemetry Data

- Data from UCSC researchers shows that the majority of mountain lions crossing Hwy 17 occurred in the Lexington Study Area in Santa Clara County.
- Two different lions, crossed the highway with a total of 6 different successful crossings at the Lexington Study Area.
- Three lions have been hit by cars where the other 2 mountain lions had successfully crossed.



# Animal-Vehicle Collision (AVC) Data

- Colored dots show the different animals that have been hit on the highway.
- The majority of animals that have been hit on Highway 17 in Santa Clara County have been hit at Trout Creek in the Lexington Study Area.
  - ❖ Trout Creek is an AVC hot spot where animals are being hit on a consistent basis.



# Trout Creek Camera Data: Deer

- 70 detections of deer approaching the Trout Creek culvert have been recorded.
  - ❖ However, deer all looked into the culvert and then walked away.
- The Trout Creek culvert does not have visibility to the other side that animals need to use it (Safe Passages 2010).



# Trout Creek Culvert Camera Data: Mesocarnivores

- In addition to deer, multiple species of mesocarnivores have approached the culvert but do not enter.



# Lexington Culvert Camera Data: Deer

- Only 2 records of deer approaching the Lexington culvert.
- No deer were observed entering the culvert.



# Lexington Culvert Camera Data: Mesocarinovres



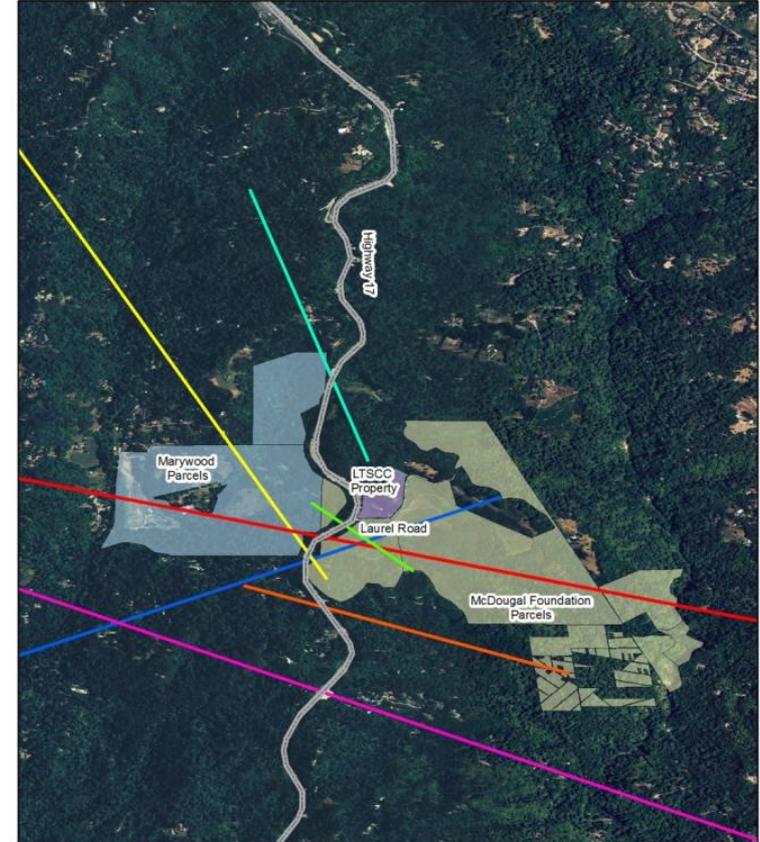
# Study Site 2: Laurel Curve Study Area

## GPS Telemetry Data

- The majority of crossings in Santa Cruz County are at Laurel Curve.
- Colored lines show pathways mountain lions used to cross Highway 17.



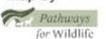
UCSC Puma Project-Hwy 17 Mountain lion Crossing Data



### Legend

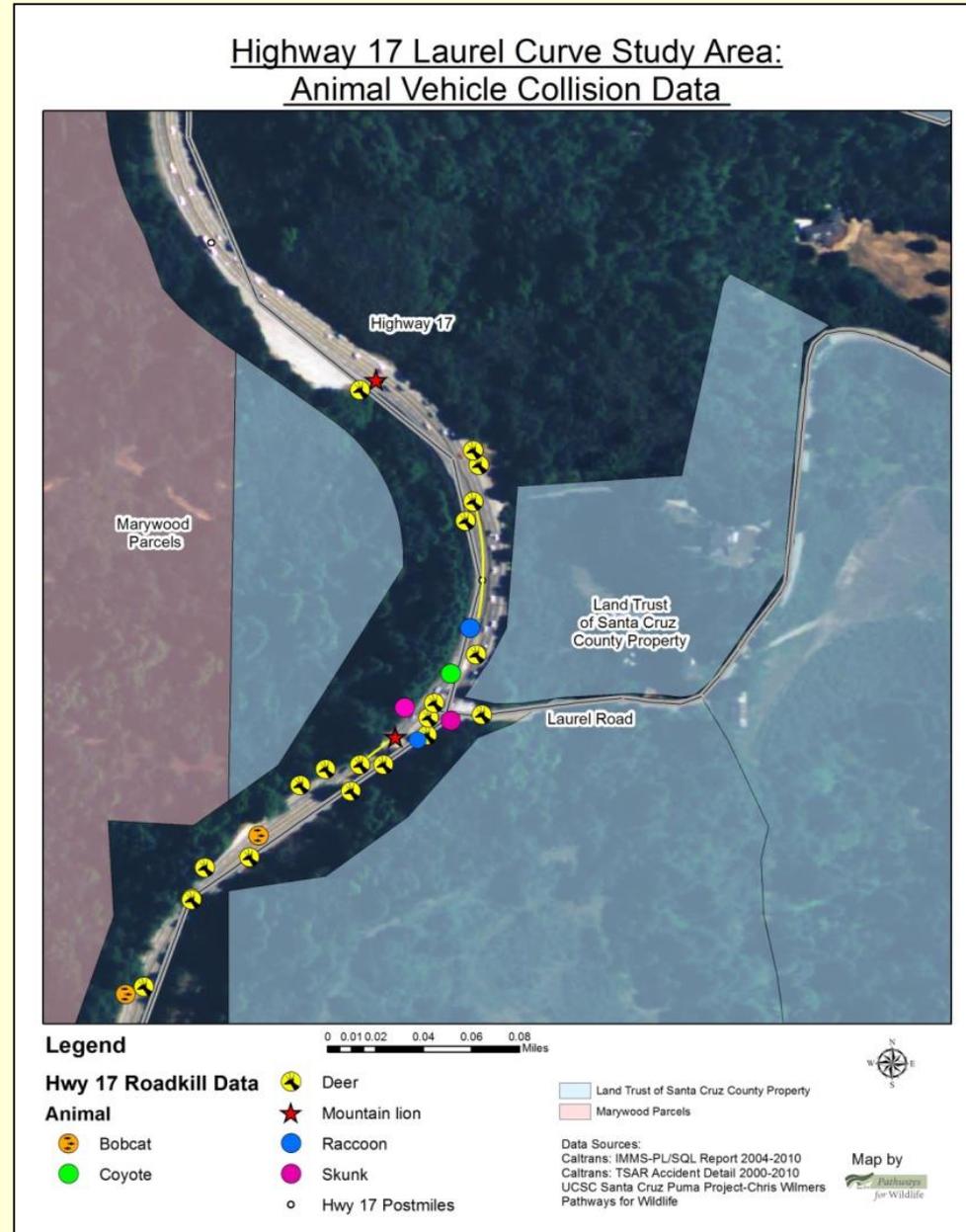
 Mountain lion Crossings	 Land Trust of Santa Cruz County Property
 Mountain lion Crossings	 McDougal Foundation Parcels
 Mountain lion Crossings	 Marywood_Parcels
 Mountain lion Crossings	
 Mountain lion Crossings	

Data Source:  
Chris Wilmers: UCSC Santa Cruz  
Puma Project

Map by  


# Animal-Vehicle Collision Data Laurel Curve

- Colored dots show the different animals that have been hit on the highway.
- ❖ Laurel Curve is an AVC hot spot where animals are hit on a consistent basis.



# Laurel Curve Camera Data

- Green dots = Camera stations from Soquel Creek to Hwy 17.
- Pathways for Wildlife has recorded several treks by individual mountain(s) towards Hwy 17 at Laurel Road.

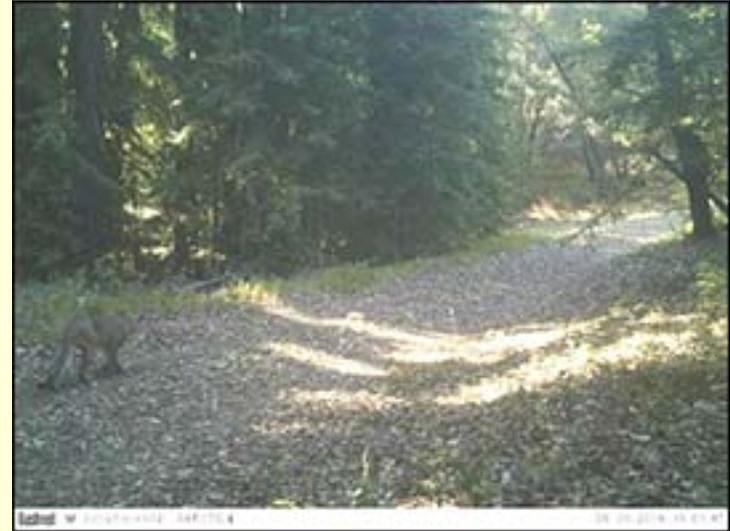
McDougal Property Camera Locations and Mountain lion Movement from Forest Cam 3 to LTSCC Wildlife Corridor



Map & Data Collection by:  
Pathways for Wildlife



# Treks from Soquel Creek to Laurel Road and Highway 17



- UCSC Puma Project noted the juvenile lion maybe the offspring of the lion hit on the Highway 17 at Laurel Curve.

# Marywood Property Across the Highway: Mountain Lion Activity.



9/28/2014



11/24/2014



5/31/2014

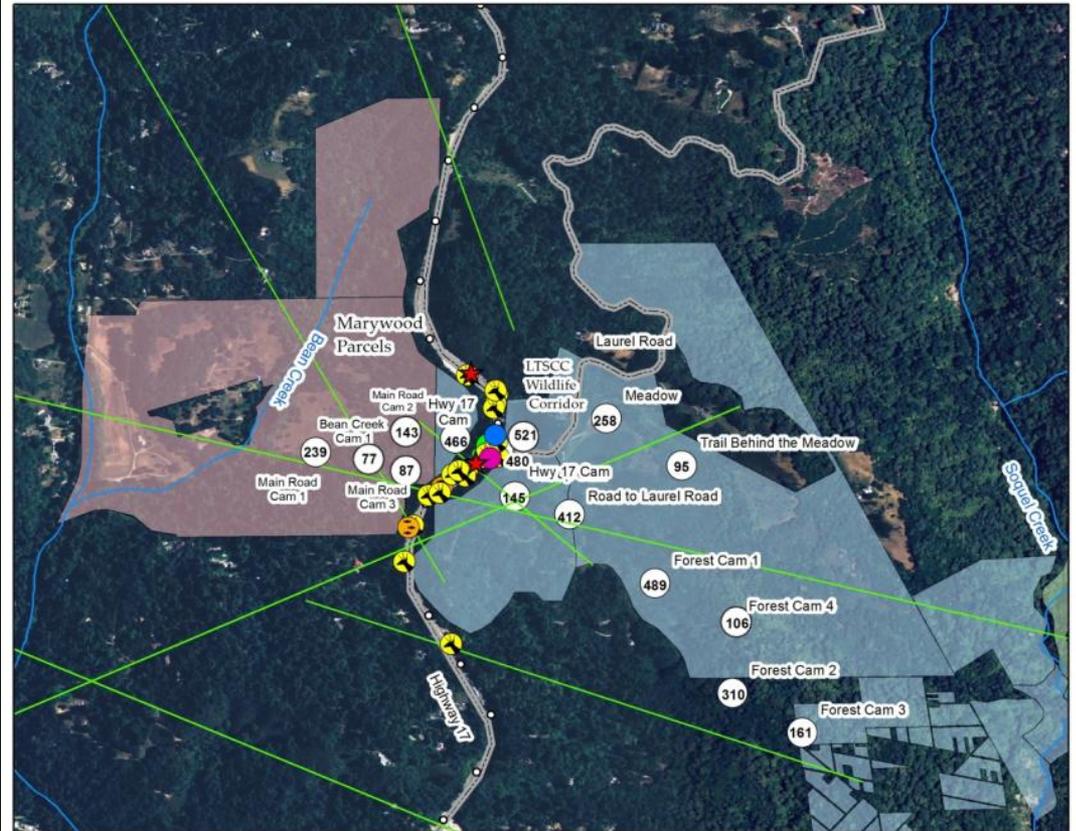
# Multiple Species Use the Same Pathways at Laurel Curve



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

Data overlays include:

- Roadkill Data
- Camera Data
- UCSC Puma Project Telemetry Data

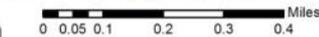


**Legend**

**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



Data Collection by:  
 Pathways for Wildlife  
 Caltrans  
 UCSC Puma Project

Map by:  
 Pathways for Wildlife



# Highway 17 Wildlife Connectivity Project: Collaborative Partnerships

In 2013/2014 the following agencies and organizations teamed up to develop solutions to improve wildlife connectivity on the Highway 17 Corridor:

1. Midpeninsula Regional Open Space District
2. Peninsula Open Space Trust
3. Land Trust of Santa Cruz County
4. Pathways for Wildlife
5. California Department of Transportation  
(Caltrans D4, D5 & HQ)
6. U.C. Santa Cruz Puma Study
7. Santa Clara County Parks
8. California Department of Fish and Wildlife
9. Santa Clara Valley Transportation Authority



# Method for Selecting and Identifying Locations to Improve Connectivity

Using the following data the team identified several locations where new wildlife crossings or retrofitting existing culverts would provide the greatest benefit for improving wildlife connectivity between protected open space and core habitat areas:

- Roadkill data: Caltrans and Pathways for Wildlife
- Camera monitoring data: Pathways for Wildlife
- GPS telemetry data U.C. Santa Cruz Puma Study



# Proposed Wildlife Crossing at Laurel Curve

## Caltrans:

- District 5/Central Region Project Development Team completed a Project Initiation Document (PID) June 2015.
- The team identified two preliminary engineering design options for a wildlife undercrossing.

## Land Trust of Santa Cruz County:

- Purchased 290 acres --- securing land on both sides of Laurel Curve.



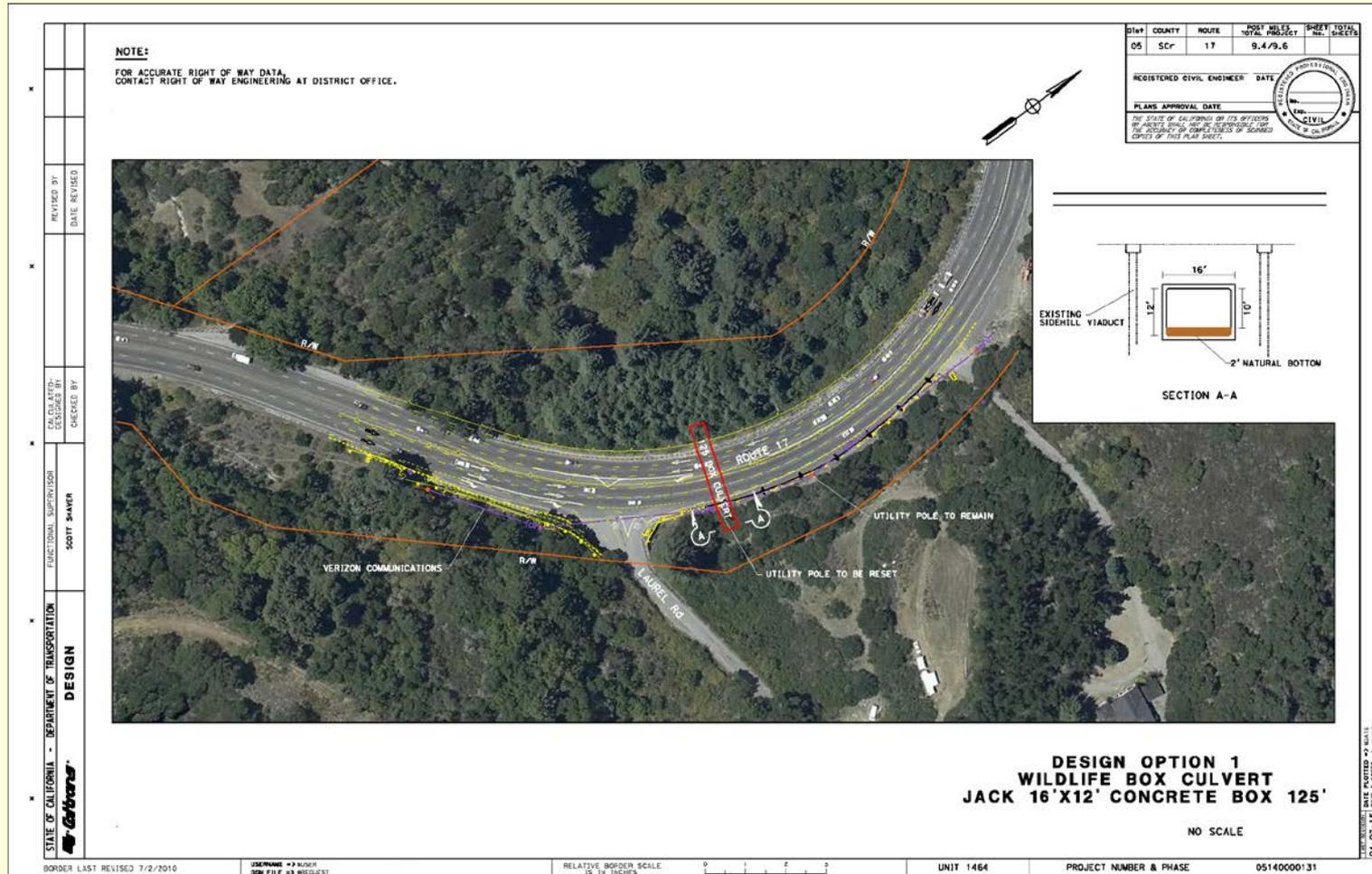
# Existing Conditions at Laurel Curve



# Proposed Wildlife Crossing at Laurel Curve

## Design Option 1

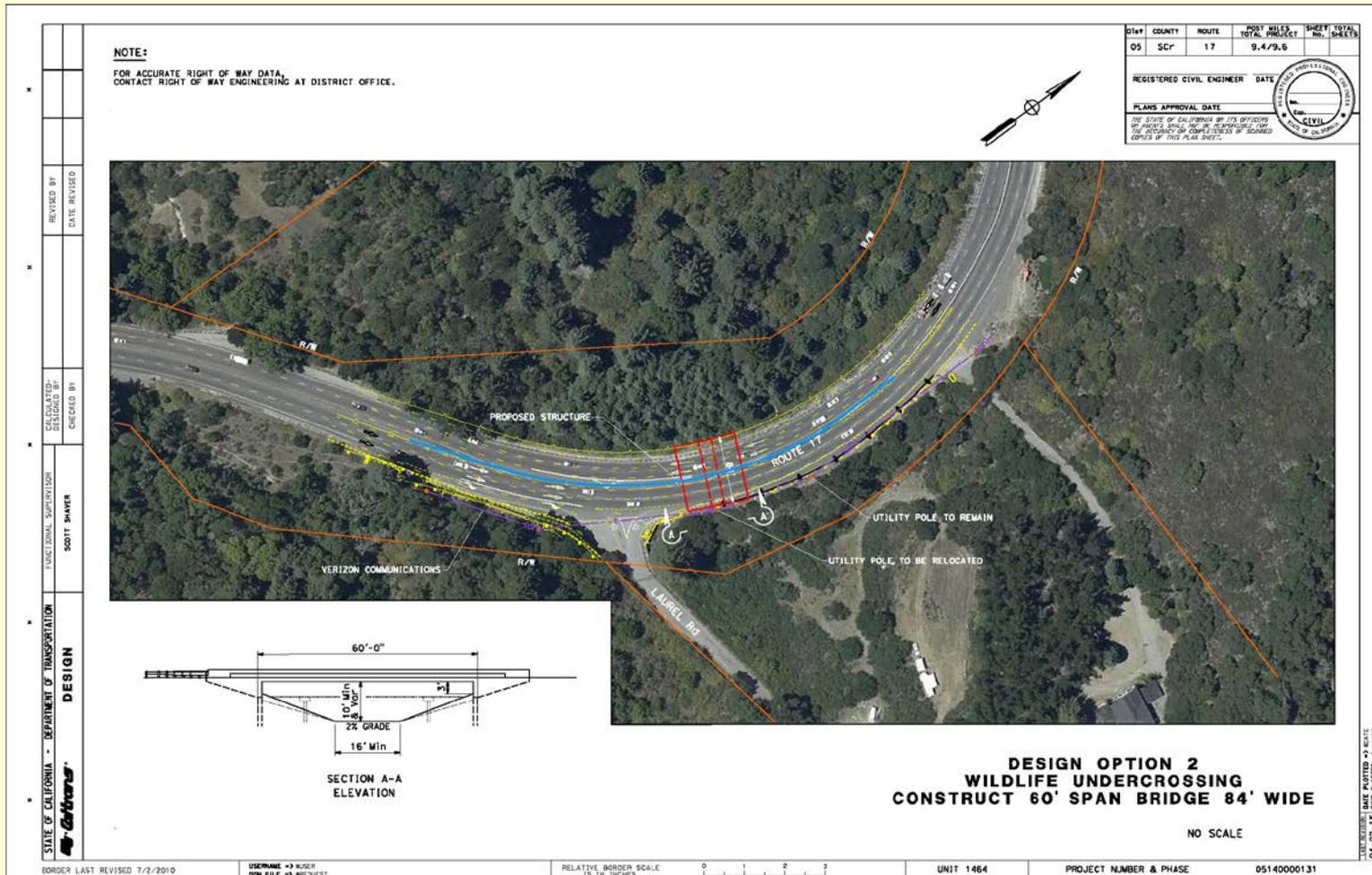
Concrete Box Culvert: 16' x 12' that is 125 feet long and backfilled with native soil



# Proposed Wildlife Crossing at Laurel Curve

## Design Option 2

Span Bridge 16' x 12' that is 60 feet in length



# Highway 17 Santa Clara County

Lexington Reservoir culvert was identified as the best location to retrofit.



- The culvert bottom is eroded, filled with woody debris, frequently has standing water, and the inlet entrance is partially blocked by vegetation.

Trout Creek culvert was identified as the best location to construct a new wildlife crossing adjacent to the existing culvert.



- The inlet is blocked by concrete debris, slopes down and takes a 90 degree turn before crossing under the highway.
- Animals frequently approach the entrance to the outlet and then turn away, choosing to climb up the bank and attempt to cross the highway.

# Summary

Information needed to choose the best locations for retrofitting, constructing and maintaining wildlife crossing structures:

- Modeling that identifies important landscape scale linkages
- Identify regional connections between existing open space and protected lands that may not be identified in larger modeling efforts.
- Data available from regional resource agency offices and Universities.
- Pre-construction wildlife studies that include roadkill studies and camera monitoring studies.
- Where applicable, project specific modeling and GPS telemetry studies for target species.
- ***Long-term monitoring to determine the effectiveness of the wildlife crossing infrastructure and maintenance needs.***



# Partners = People



## Thanks to All of the Project Partners!

### Special thanks to the following staff:

Kirk Lenington - Midpeninsula Open Space Trust  
Daniel Olstein – Peninsula Open Space Trust  
Dan Medeiros – Land Trust of Santa Cruz County  
Chris Wilmers – U.C. Santa Cruz Puma Study  
Don Rocha- Santa Clara County Parks  
Dave Johnston – California Department of Fish and Wildlife  
Ann Calnan – Santa Clara Transportation Authority



California Department of  
Fish and Wildlife

### And the following Caltrans Environmental staff:

Amy Bailey – Caltrans HQ  
Amy Golden – Caltrans HQ  
Jim Henke – Caltrans HQ  
Lindsay Vivian – Caltrans D4  
Christopher Pincetich – Caltrans D4  
Frankie Malumd-Roam – Caltrans D4  
Robert Young – Caltrans D4

