Highway 17 Laurel Wildlife Crossing Study
2023-2024

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Pathways for Wildlife

For the Land Trust of Santa Cruz County,
the California Department of Transportation, and the
Wildlife Conservation Network

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1.0 Executive Summary

Purpose and Need

Highway 17 is a four-lane expressway connecting Santa Cruz County to the greater Bay Area. Highway 17 bisects the Santa Cruz Mountains from the Town of Los Gatos to the city of Santa Cruz and is a wildlife-sensitive highway due to the high incidence of animal-vehicle collisions (Pathways for Wildlife 2015-2026). Factors such as dense traffic, concrete median barriers, and lack of culvert or bridge under-crossings create a significant barrier to regional wildlife connectivity by bisecting the Santa Cruz Mountains (Wilmers et al. 2013).

This fragmentation poses a threat to genetic isolation, potentially impeding the influx of new individuals into the population (Beier 1993 & 1995). Thus, the construction of the Highway 17 Wildlife Crossing at Laurel Curve was initiated to improve the ability for animals to cross the highway. Before this crossing was built, Highway 17 lacked suitable culverts and bridges, which resulted in frequent wildlife fatalities on the highway.

Habitat Connectivity Needs

A study on mountain lion genetics has revealed that the Central Coast population, which includes the counties of Santa Cruz and Santa Clara, has a low effective genetic population size (Ne: 15–16; Gustafson et al. 2018). Based on this finding, the Santa Cruz Mountain lion population is undergoing a review by the California Department of Fish and Wildlife (CDFW) as a candidate species for potential listing as a threatened or endangered species. Experts assert that there needs to be at least one new individual immigrating into a population each year to maintain a genetically healthy population (Beier 1993). Based on the Pathways for Wildlife roadkill data collection over the past decade, one or more mountain lion fatalities due to vehicle collisions have been documented on Highway 17. This could be a contributing factor to the

low genetic effective population size and impede gene flow within the Central Coast mountain lion population.

Background: Highway 17 Wildlife Connectivity Study Conducted by Pathways for Wildlife in 2013–2016

In September 2013, the Land Trust of Santa Cruz County (LTSCC) hired Pathways for Wildlife to join as project partners to work with Nancy Siepel at Caltrans District 5 and the University of California Santa Cruz (UCSC) Puma Project to identify the optimal location for a wildlife crossing structure on Highway 17 in Santa Cruz County. To identify the best location for a potential wildlife crossing, Pathways for Wildlife created a comprehensive study design that incorporated three types of data collection and then overlaid the results using Geographic Information System (GIS) mapping software. The data included 1) roadkill data, 2) the UCSC Puma Project radio collar data of mountain lions that had successfully crossed the highway, and 3) field camera data collected at the existing culverts. This study was conducted over three years from 2013 to 2016.

The results identified a roadkill Hot Spot Location, where animals were consistently being hit at the Laurel Curve on Highway 17. The radio collar data from the UCSC Puma Project revealed that the majority of the successful crossings over Highway 17 by radio-collared mountain lions also occurred at Laurel Curve (Figure 1). Additionally, the Pathways for Wildlife roadkill data identified two mountain lions that were hit within the study area within the three years. This indicated that Laurel Curve is a section of the highway where mountain lions are continually trying to cross the highway.

The roadkill data collected along the Highway 17 Corridor showed that Laurel Curve had the highest recorded number of species fatalities between the City of Santa Cruz and the Summit (Appendix A Table 1: roadkill data summary). On the entire stretch of Highway 17 in Santa Cruz County, 77 animals were hit, and 34 out of the 77 animals were hit within the Laurel Curve study area. Approximately, half of the total data were recorded at the study site. Subsequent review by Caltrans District 5, the CDFW, and the project partners led to the identification of Laurel Curve as the optimal location for the installation of a wildlife crossing.

Construction of the Highway 17 Laurel Curve Wildlife Crossing: written contribution by Morgan Roberston, Office Chief, Biology and Environmental Engineering, Caltrans District 5.

When the Laurel Curve Wildlife Crossing Project was first discussed in 2013, it presented a great opportunity for Caltrans District 5 to partner with a diverse group of public and private organizations. Caltrans District 5 partnered with the LTSCC, Pathways for Wildlife, the Regional Transportation Commission of Santa Cruz County, the CDFW, and the UCSC Puma Project to identify the best locations for wildlife crossing structures on Highway 17 in Santa Cruz County. The GPS/radio telemetry, wildlife camera, and roadkill data that were collected by Pathways for Wildlife and UCSC supported that Laurel Curve was a

prime location where a wildlife crossing structure would provide the greatest benefit for restoring habitat connectivity.

In 2015, Caltrans District 5 assembled a Project Development Team to conduct a feasibility study for a wildlife crossing at Laurel Curve, and they coordinated with the Regional Transportation Commission of Santa Cruz County and other partners to identify funding for future phases. The Caltrans team then completed environmental assessments (California Environmental Quality Act [CEQA]/National Environmental Policy Act [NEPA]), project reports, and engineering design plans, specifications, and estimates for a construction contractor bid package. In 2022, Caltrans worked with Graniterock Construction to build the wildlife undercrossing at Laurel Curve, which was completed in December 2022. The crossing project included wildlife exclusion fencing and escape ramps to facilitate wildlife to safely exit the highway. Electrified concrete was installed at two road ingress points to deter animals from entering the highway. Furthermore, the construction project incorporated landscape planting that included a variety of native species to restore vegetative cover and promote wildlife use of the undercrossing.

Caltrans' overall investment was $5.14 million in support costs alone. This was matched by $5 million toward project construction, which was provided by the Regional Transportation Commission through a local tax measure that was passed in 2016 and supported by over 2/3 of the voters. An additional $10 million was invested by the LTSCC to support construction and to conserve over 700 acres of land parcels in the corridor adjacent to the new undercrossing. Each partner leveraged funds for a community-driven project with broad support and applied their areas of expertise to address the project components. The unique partnership created a new mitigation incentive framework for conservation and wildlife protection projects in California, paving the way for SB790. This law supports the implementation of wildlife crossings statewide using the model that was pioneered by this project.

This transformative project provides safe passage and habitat connectivity for wildlife and improves traffic safety by reducing collisions on the highway between drivers and wildlife. Governor Newson has stated that "the project in Santa Cruz is vital to our overall strategy of preserving California's natural beauty" and "it [is] going to take more crossings and innovations to protect California's wildlife and natural habitats."

Post Construction Monitoring of Wildlife Movement and Passage Rates through the Crossing

This study is part of a three-year monitoring study to document wildlife movement through the newly constructed wildlife crossing at Highway 17 Laurel Curve. This report includes the data results, key findings, and a summary of the first year of monitoring. The cameras were set up in January 2023, and the first year of monitoring includes the months of February 2023 - January 2024.

This monitoring study was informed by the previous study that was conducted by Pathways for Wildlife for the LTSCC and Caltrans, which documented the need for a wildlife crossing to facilitate safe passage under Highway 17 at Laurel Curve. We used the baseline data that were collected in the 2013–2016 study to develop the study questions and objectives.

The main **study questions** included:

1. "Following the construction of the wildlife crossing, will wildlife utilize the crossing to travel under Highway 17 at Laurel Curve?"

2. "Which species will travel through the crossing and what is the frequency of the passage rates per species that are recorded traveling through the crossing?".

3. "Are there wildlife species traveling on either side of the wildlife crossing but not traveling through it?".

6. "Is there a decline in the number of roadkills at the wildlife crossing when compared with the number of roadkills recorded in the 2013–2016 study?".

7. "How effective is the wildlife crossing structure and is it able to improve the safety of the highway for both wildlife and drivers at the Highway 17 Laurel Curve based on the findings of these study questions?".

The **objectives of the study** were to answer the study questions by using several different field methods as follows:

1. Set up a camera trap array at the wildlife crossing to document the passage rates and the wildlife that approaches the crossing but does not travel through it.
2. Use the camera data to record the passage rates by species and individuals, where possible, and compare the non-passage rates of each species.
3. Conduct roadkill surveys with the same frequency as the surveys that were conducted in the 2013–2016 study to compare the two time periods and determine if there has been a change in wildlife-vehicle collisions, for example, a decline in wildlife collisions with vehicles.
4. To compare the species' use of the crossing using cameras positioned on either side of the structure and camera data from the 2013–2016 study to identify species that are not using the structure but that have been previously documented traveling on either side of the crossing.

First Year Results

Camera Data Analysis

A total of 1,013 animals were recorded by the camera stations at the wildlife crossing. Out of the total number of detections, there were 934 passages of animals traveling through the crossing, with 79 records of non-passages. Non-passages are records in which animals are recorded traveling up to the wildlife crossing, investigating it but not traveling through the crossing and turning away from it. The species that were recorded using the wildlife crossing to travel under the highway included bobcat (*Lynx rufus*), gray fox

(*Urocyon cinereoargenteus*), black-tailed deer (*Odocoileus hemionus, ssp. columbianus*), mountain lion (*Puma concolor*), opossum (Didelphidae), and skunk (Mephitidae). Among these six species, the species with the highest passage rates was the black-tailed deer, with 864 passages. There were 56 passages by gray foxes, seven passages by bobcats, four passages by mountain lions, two passages by opossums, and one passage by a skunk.

In terms of the overall successful wildlife passages, from February to April there was a slow increase in the passage rates, ranging from 14 to 29 passages. Then, in May, there was an increase in the passage rates to 94 passages. Between June and November, there was a steady increase in the passage rates except for a decrease in the passage rates in July.

The rates of passage by month and species were displayed graphically to compare the variation in the passage rates. The black-tailed deer passage rate was the highest in June and November. Among the 864 deer passage records, 777 individual deer were identified. Additionally, different individual females traveling with juveniles and different bucks were identified by counting the number of times they were recorded based on their antler system and the tine sizes.

There was an increase in the male deer passage rates in November. This could be because of the rutting season when the male deer travel together in the Fall. We recorded an increase in the number of individual male deer traveling through the wildlife crossing and male deer traveling together from late October to November 2023. In November 2023, we recorded a total of five different bucks traveling through the wildlife crossing. During the summer and fall, juveniles often traveled with their parents, which likely accounted for the increase in the passage rates from July to November. We also recorded several different female deer traveling with juveniles.

Gray fox detections drastically declined, with no detections from May to September. Then, in November, there was an increase in the number of gray fox detections. The first bobcat detection occurred on the day that the cameras were set up on January 30th 2023. However, there were no further bobcat passages recorded until November–January 2023, with an increase in the passage rates in January. Overall, there was a very low number of mesocarnivores, such as opossums and skunks. Interestingly, no raccoons were recorded using the crossing despite previous roadkill records within the study area during the 2013–2016 study.

There were four documented crossings by mountain lions (Chart 6). From the camera footage, each crossing appears to have been conducted by a male mountain lion (Figure 17). The first mountain lion to use the wildlife crossing was recorded on 11/28/2023, and the second record was on 12/15/2023. The third and fourth records were on the same day on 1/2/2024, where a male mountain lion traveled west through the crossing into Marywood at 2:07 am and then back east into Lions Gate at 9:18 pm.

Roadkill Data Analysis

We compared the roadkill data that were collected from February 2023 to January 2024 with the baseline roadkill data that were collected from 2013 to 2016. The purpose of this analysis was to assess the effectiveness of the Highway 17 Wildlife Crossing structure, directional fencing, three jump-outs, and

electrified mat across the Laurel Road exit in reducing wildlife-vehicle collisions within the study area. Bi-monthly roadkill surveys were conducted to replicate those that were conducted from 2013 to 2016 and compare the results. From February 2023 to January 2024, we recorded only one animal that was hit within the Highway 17 Laurel Curve study area. A sub-adult mountain lion was hit at the end of the directional fencing on the northern side of the study area in the northbound lanes on 4/2/2023. There is a small ravine leading up to the highway where the mountain lion was found. One possible recommendation based on this finding could be to further extend the directional fencing to this ravine area where the mountain lion was hit to mitigate further collisions. Apart from this mountain lion, there were no other recorded roadkills within the Highway 17 Laurel Curve study area. This is a significant decrease in the number of wildlife-vehicle collisions when compared with the 2013–2016 data collection, especially concerning black-tailed deer. In particular, deer were consistently recorded as roadkill within the study area each year throughout the 2013–2016 roadkill survey.

Discussion on the Effectiveness of the Wildlife Crossing

The combination of the camera data and roadkill data demonstrated that the Highway 17 Wildlife Crossing, directional fencing, three jump-outs, and electrified mat across the Laurer Curve Road exit were effective in reducing wildlife-vehicle collisions within the study area. There was only one animal, a young mountain lion, that was recorded as roadkill, which was approximately 0.38 miles away from the wildlife crossing, at the northernmost extent of the study area. No other species were recorded as roadkills within the study area. During the 2013–2016 study, 26 deer were recorded as roadkills on Highway 17 at Laurel Curve. However, there were no documented deer wildlife-vehicle collisions within the current study. This indicates that the wildlife crossing and its design features are effectively reducing deer mortality due to motor vehicle collisions.

In addition to the decline in deer collisions, there was a high number of black-tailed deer that used the wildlife crossing to safely travel under the highway. Multiple deer individuals were recorded using the wildlife crossing on a weekly basis. These results demonstrate that the wildlife crossing is facilitating a high number of deer passages and reducing wildlife-vehicle collisions. Consequently, the crossing increases highway safety for both wildlife and vehicle drivers.

2.0 Introduction

2.1 Purpose and Need

Highway 17 is a four-lane expressway connecting Santa Cruz County to the greater Bay Area. Highway 17 bisects the Santa Cruz Mountains from the Town of Los Gatos to the city of Santa Cruz, and it is a wildlife-sensitive highway due to the high number of animal-vehicle collisions that occur on a consistent basis (Pathways for Wildlife 2015–2026). Factors such as dense traffic, concrete median barriers, and lack of culvert or bridge under-crossings create a significant barrier to regional wildlife connectivity since the highway bisects the Santa Cruz Mountains (Wilmers et al. 2013).

The Santa Cruz Mountains are becoming increasingly isolated due to habitat fragmentation, which is making it more difficult for species, such as mountain lions, to traverse the mountain range. This poses a threat of genetic isolation if new individuals cannot immigrate into the population (Beier 1993 & 1995). Before the construction of the Highway 17 Wildlife Crossing at Laurel Curve, Highway 17 lacked appropriate culverts and bridges for animals to cross the highway, resulting in frequent wildlife fatalities.

Habitat Connectivity Needs

The Santa Cruz Mountain lion population serves as an important source population, with documented breeding individuals that produce juveniles that will need to disperse out of their parental home range (Wilmers et al. 2013). The home ranges of mountain lions in the Santa Cruz Mountains span approximately 160 km² for males and 60 km² for females (UCSC Puma Project). Dispersing juveniles must often travel extensive distances, avoid established adult male territories, and travel through a fragmented landscape that includes a matrix of roads and highways (Forman 2010, Urban Carnivores 2010).

A study on mountain lion genetics revealed that the Central Coast population, which includes the counties of Santa Cruz and Santa Clara, has a low effective genetic population size (Ne: 15–16; Gustafson et al. 2018). Based on this finding, the Santa Cruz Mountain lion population is undergoing a review by the CDFW as a candidate species for potential listing as a threatened or endangered species. Experts asserted that the immigration of at least one new individual into a population is required each year to maintain a genetically healthy population (Beier 1993). Based on the Pathways for Wildlife roadkill data collection over the past decade, there have been one or more documented mountain lion fatalities due to vehicle collisions on Highway 17. This could be a contributing factor to the low genetic effective population size and impede the gene flow of the Central Coast mountain lion population. This supports the need for establishing habitat connectivity for mountain lions and other wildlife species to facilitate movement across the landscape, increase gene flow, and ensure viable population health.

It has been widely documented that the construction of wildlife crossings can be beneficial for reconnecting habitats as they allow animals to safely cross the highway (Hilty et al. 2019). Wildlife crossing structures have been used successfully throughout the world to connect fragmented habitats and provide safe

passages for wildlife movement across existing roads (Safe Passages 2010). These crossing structures can range from culverts and underpasses for safe passage underneath the highways or they can be overpasses and land bridges for crossing over the road. Wildlife crossing structures are very successful. For example, they almost doubled the population size of the Florida panther (*Puma concolor coryi*) and prevented vehicle collisions with mountain lions and other wildlife in Banff Canada (Gloyne & Clevenger 2001, Safe Passages 2010).

2.2 Highway 17 Wildlife Connectivity Study Conducted by Pathways for Wildlife in 2013–2016

In September 2013, LTSCC hired Pathways for Wildlife to join as project partners to work with Nancy Siepel and Morgan Robertson at Caltrans District 5 and Chris Wilmers of the UCSC Puma Project to identify the best location for a wildlife crossing structure on Highway 17 in Santa Cruz County.

Wildlife Vehicle Collision and Puma Collar Data Overlay Results

To identify the best location for a potential wildlife crossing, Pathways for Wildlife created a study design that incorporated three types of data collection and then overlaid the results using GIS mapping software. The data included: 1) roadkill data, 2) UCSC Puma Project radio collar data of mountain lions that had successfully crossed the highway, and 3) field camera data from arrays leading up to the highway on both sides of the highway. This study was conducted over three years from 2013 to 2016. The results identified a roadkill Hot Spot Location, where animals were consistently being hit at Laurel Curve on Highway 17. The radio collar data from the UCSC Puma Project revealed that the majority of successful crossings over Highway 17 by radio-collared mountain lions also occurred at Laurel Curve (Figure 1). Furthermore, the Pathways for Wildlife roadkill data identified two mountain lions that were hit within the study area within the three years. This indicated that Laurel Curve is a section of the highway where mountain lions are continually trying to cross the highway.

The roadkill data collected along the Highway 17 Corridor showed that Laurel Curve had the highest recorded number of species that were hit between the City of Santa Cruz and the Summit (Appendix A Table 1: roadkill data summary). On the entire stretch of Highway 17 in Santa Cruz County, a total of 77 animals were hit, and 34 out of the 77 animals were hit within the Laurel Curve study area. Approximately, half of the total data were recorded at the study site.

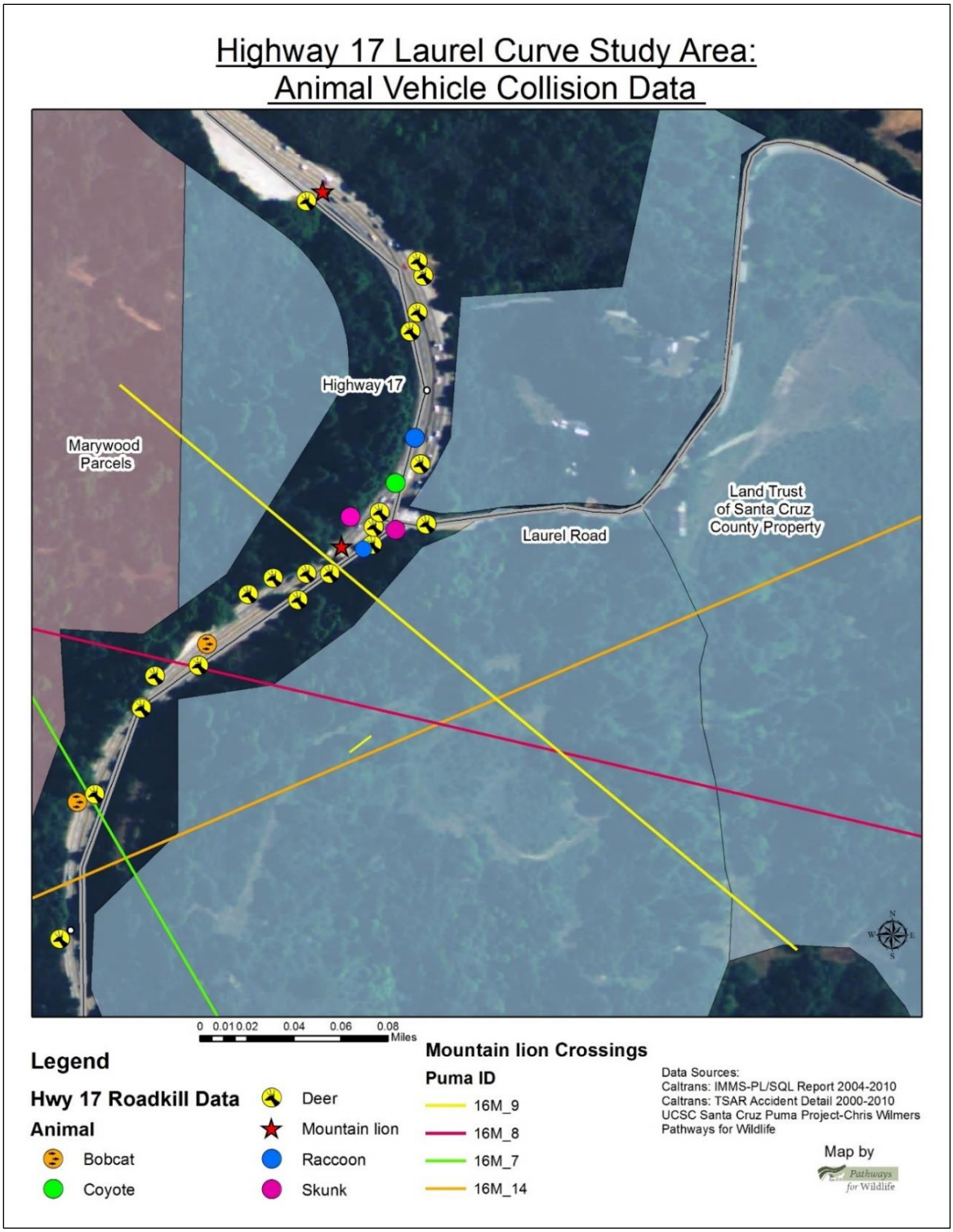
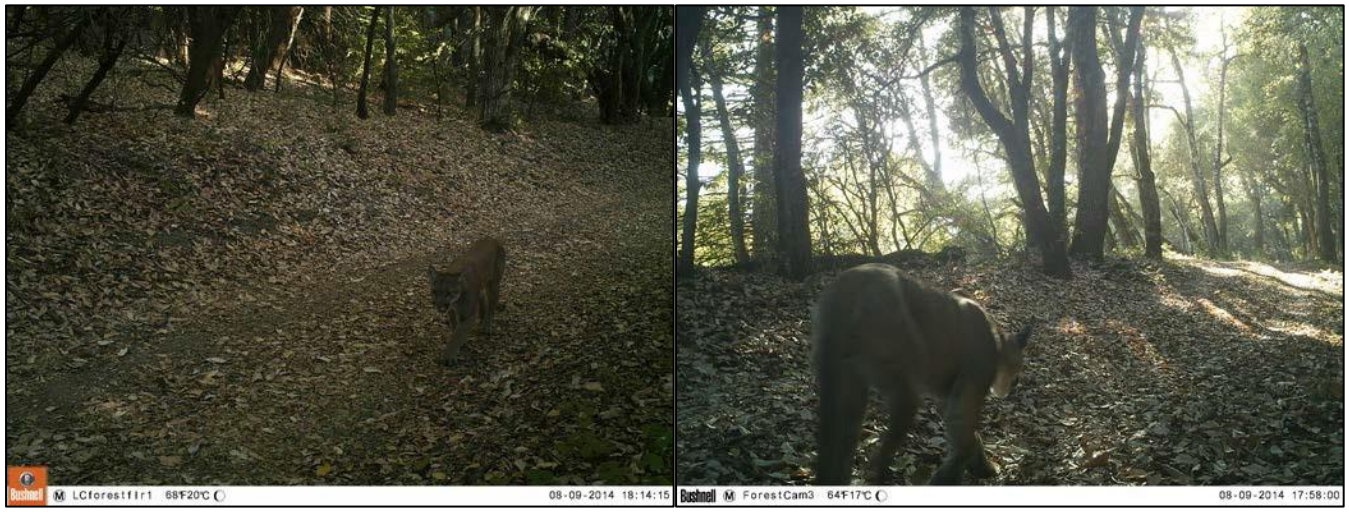


Figure 1. Highway (Hwy) 17 roadkill data and University of California Santa Cruz Puma Project's mountain lion collar data overlay.

Camera Array Data Results

Extensive camera arrays were set up on both the west and east sides of the highway to document wildlife traveling through the properties and locations approaching the highway. Over ten individual mountain lions, including females with kittens and males, were recorded on both sides of the highway. From June 2014 to October 2014, an adult male mountain lion was consistently recorded traveling from Soquel Creek on the southeastern end of the property up to Highway 17 and then back down to Soquel Creek. This mountain lion was recorded along the array of camera stations leading up to Highway 17 (Figures 2 and 3).

On October 30, 2014, a large male mountain lion was hit on Highway 17 on the southbound side of Laurel Curve at 8:00 pm. The mountain lion was picked up by a CDFW Warden and given to the UCSC Puma Project, who confirmed the sex and age of the mountain lion (Paul Houghtaling, UCSC Puma Project pers. comm.). This information and the camera data that were collected on that same evening supported that the resident male mountain lion began his 7th and last trip from Soquel Creek to Highway 17 and was hit by a vehicle in an attempt to cross the highway.



Figures 2 and 3. Male mountain lion traveling toward the east side of the highway on 8/9/2014.

These data results were then reviewed by the Caltrans District 5 biologists, CDFW, and project partners. Laurel Curve was identified as the best location for the installation of a wildlife crossing.

3.0 Study Area and Construction of the Laurel Curve Wildlife Crossing

Highway 17 runs northbound and southbound between the counties of Santa Clara and Santa Cruz. It is 26.49 miles in length and is a commuter highway with high traffic volumes occurring throughout the day. From its southern terminus with SR-1 in Santa Cruz, Highway 17 begins as a five-lane freeway (narrowing to four lanes after Pasatiempo Drive). It proceeds through Scotts Valley, and at the north end of Scotts Valley, it becomes a four-lane divided highway (Figure 4). The highway crosses the Santa Clara/Santa Cruz county line through the Patchen Pass, which is commonly referred to as "The Summit", at an elevation of 1,800 feet (549 m), where there is an interchange with SR 35. North of the summit, a winding descent of the mountains begins, with access at various points and mostly without grade separations until reaching Los Gatos. At Los Gatos, SR 17 becomes a freeway, expanding to six lanes after an interchange with SR-85, and then it transitions into SR-880 (Figure 4).

Highway 17 is well known as a dangerous highway due to a combination of narrow lanes, dense traffic, slow trucks, sharp turns, blind curves, sudden changes in traffic speeds, heavy rains resulting in mudslides, and wildlife, such as black-tailed deer and mountain lions, attempting to cross the highway, which has led to a high number of collisions and fatalities. Thus, SR 17 is considered to be one of the most dangerous highways in the state (Caltrans website, District 5).

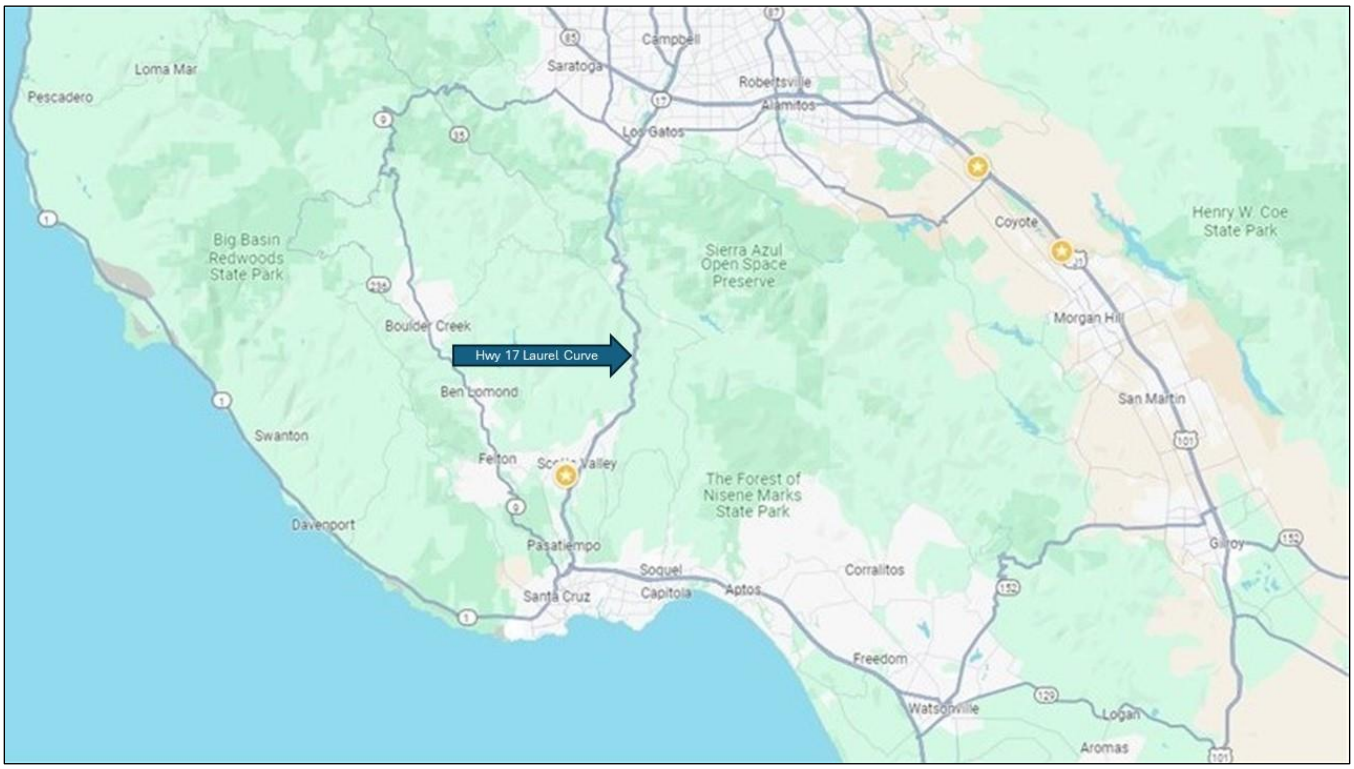


Figure 4. Map of Highway 17 map that is used as an inset map in Figure 8.

Laurel Curve at Highway 17 consists of a 4-lane highway, with two southbound lanes and two northbound lanes (Figure 5). Laurel Curve is 3.25 miles north of Scotts Valley (Figure 6). In 2012, Caltrans installed median barriers at this particularly treacherous piece of the road. This effort to increase safety for people, unfortunately, made it even more difficult for local wildlife, such as bobcats, gray foxes, mountain lions, and black-tailed deer to cross the highway. Extensive roadkill data collection identified Laurel Curve on Highway 17 as one of the deadliest sections of the highway for wildlife (Figure 6; Diamond & Snyder 2016).

Figure 5. Laurel Curve on Highway 17. Photo credit Steve Mandel.

From 2014, the LTSCC successfully worked toward protecting one small and two large properties on either side of the Highway 17 Laurel Curve, namely Mansion (east side) Lion's Gate (west and east side) and Marywood (west side; Figure 6). This resulted in a total of 420 acres of relatively undeveloped habitat on either side of the highway being protected, which supported the viability of the wildlife corridor/linkage as a wildlife crossing at Laurel Curve could facilitate movement between open space habitats. While the LTSCC worked on protecting land on either side of Laurer Curve, the Caltrans District 5 wildlife biologists, Nancy Siepel and Morgan Roberston, and their Planning Team worked on the first statewide mitigation agreement between Caltrans and the CDFW to fund the construction of the Highway 17 Laurel Curve wildlife crossing.

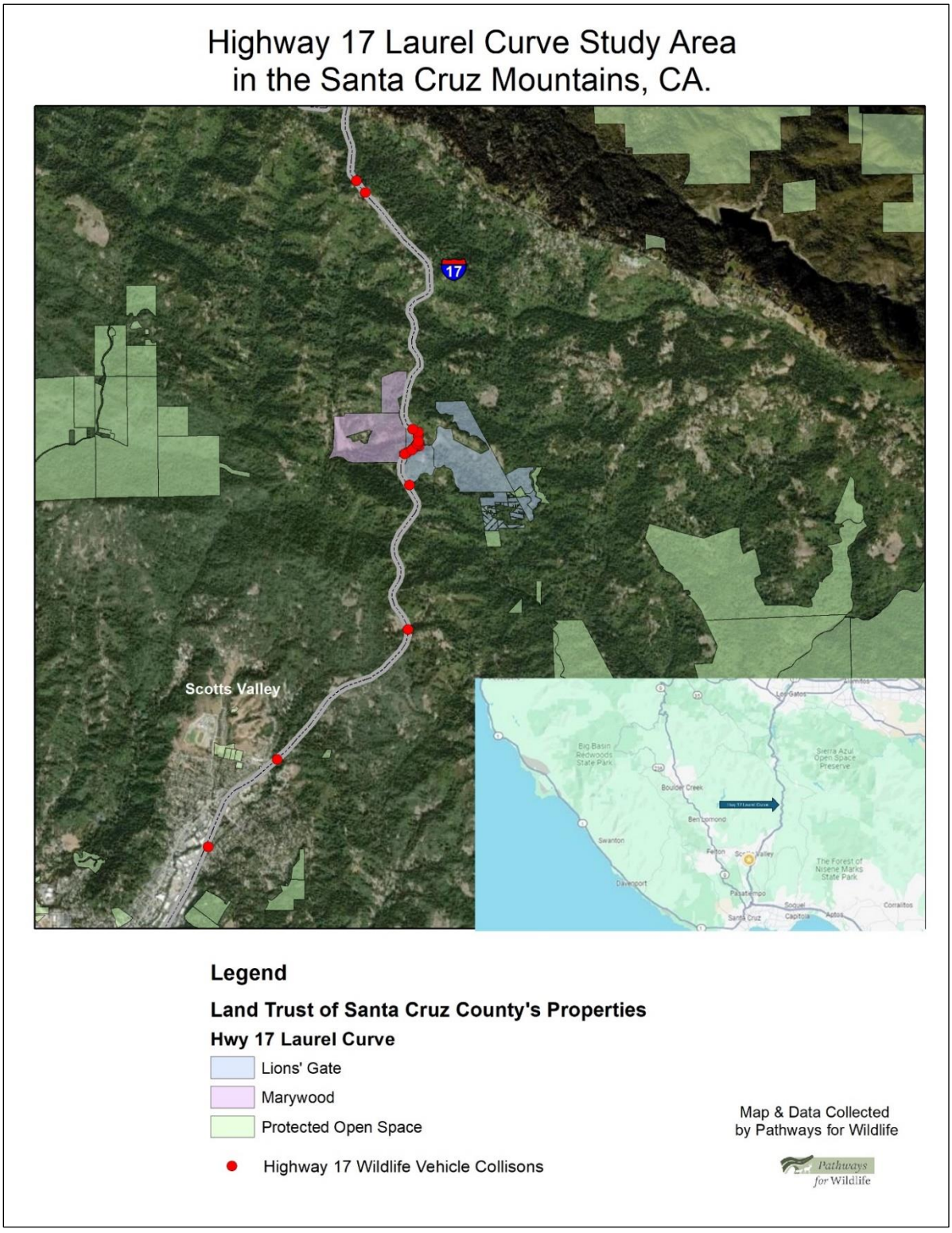


Figure 6. The Highway (Hwy) 17 Laurel Curve Study Area.

Laurel Curve on Highway 17 consisted of a large cement viaduct, which was completely impermeable to wildlife movement and a barrier (Figure 7). The viaduct was built on fill dirt (Figure 8).

Figure 7. Cement wall viaduct at the Highway 17 Laurel Curve.

Figure 8. The fill dirt of the viaduct at the Highway 17 Laurel Curve.

To create the wildlife crossing structure, Caltrans excavated the existing fill dirt. The excavation resulted in a 13.5 ft high, 71 ft wide, and 85 ft long crossing structure (Figures 9 and 10).

Figure 9. Post excavation of the Highway 17 Wildlife Crossing.

Figure 10. Post excavation of the Highway 17 Wildlife Crossing, east view.

4.0 Study Goals and Objectives

4.1 Study Design: Post-Construction Monitoring of Wildlife Movement and Passage Rates through the Crossing

The purpose of this project was to build upon the previous study that was conducted by Pathways for Wildlife in 2013–2016 for the LTSCC and Caltrans, which documented the need for a wildlife crossing to facilitate safe passage under Highway 17 at Laurel Curve. The findings of this study were used to assess the efficacy of the construction of the wildlife crossing (tunnel) at Laurel Curve in facilitating safe passage for wildlife under the highway and reducing wildlife-vehicle collisions.

Camera arrays were deployed on either side of the crossing to document species use, passage rates, and juveniles traveling with parents. The baseline data that were collected from 2014 to 2018 on either side of the crossing at Lions Gate and Marywood were compared with the species detections in this study. For example, the number of female mountain lions with kittens and/or males that were recorded traveling through the crossing structure was compared with previous records of mountain lion movement on the two properties (Figures 4–6).

Moreover, the roadkill data that were collected from 2013 to 2016 were also compared with this study's roadkill surveys to determine if there was a decline in the roadkill rates within the study area. The roadkill data and the passage rates through the tunnel were used to determine the effectiveness of the crossing structure.

4.2 Study Questions

This study is part of a three-year monitoring study to document wildlife movement through the newly constructed wildlife crossing at Highway 17 Laurel Curve. The cameras were set up in January 2023, and the first year of monitoring includes the months of February 2023 - January 2024.

The study questions were as follows:

1. "Following the construction of the wildlife crossing, will the wildlife utilize the crossing to travel under Highway 17 at Laurel Curve?".
2. "Which species will travel through the crossing and what is the frequency of passage rates per species that are recorded traveling through the crossing?".
3. "How many individuals of each species use the crossing when individuals can be identified from the camera data?".

4. "Are there wildlife species traveling on either side of the wildlife crossing but not traveling through it?".

5. "Are there species not using the crossing but that have been previously recorded traveling on either side of Highway 17 in the 2013–2016 study?".

6. "Is there a decline in the number of wildlife-vehicle collisions at the wildlife crossing when compared with the number of roadkills recorded in the 2013–2016 study?".

7. " How effective is the wildlife crossing structure and is it able to improve the safety of the highway for both wildlife and drivers at the Highway 17 Laurel Curve based on the findings of these study questions?".

4.3 Objectives of the Study

The objectives of the study were to answer the study questions by utilizing several different field methods as follows:

1. Set up a camera trap array at the wildlife crossing to document the passage rates and the wildlife that approaches the crossing but does not travel through it.
2. Use the camera data to record the passage rates by species and individuals, where possible, and compare the non-passage rates of each species.
3. Conduct roadkill surveys with the same frequency as the surveys that were conducted in the 2013–2016 study to compare the two time periods and determine if there has been a change in wildlife-vehicle collisions, for example, a decline in wildlife collisions with vehicles.
4. To compare the species' use of the crossing using cameras positioned on either side of the structure and camera data from the 2013–2016 study to identify species that are not using the structure but that have been previously documented traveling on either side of the crossing (Figures 11–13).

Figure 11. Female mountain lion with two kittens at the Highway 17 Laurel Curve at Lions Gate on 12/23/2018.

Figure 12. Marywood mountain lion traveling with three of four kittens on 10/27/2018.

Figure 13. Male mountain lion recorded traveling at Lions Gate on 7/30/2018, which was found as a roadkill on the Highway 17 Laurel Curve on 12/4/2018, four months later.

5.0 Methods

5.1 Field Camera Monitoring

Task 1. Camera Deployment and Checking Cameras

Digital infrared ("no-glow") camera stations were set up at the study sites, positioned at each site to detect whether or not wildlife was approaching the crossing structure and crossing through it. The monitoring period will consist of three years of checking the field camera stations and conducting routine roadkill surveys each month.

Task 2. Camera Data Entry

The data were analyzed to identify the use (investigation and successful passage) and frequency of crossings by species. Data entry from the camera stations also included the identification of individual animals, where possible, animals traveling with juveniles, and relevant ecological information, such as species interactions. Analysis by season was conducted to determine any seasonal movement patterns due to occurrences, such as flooding events. Special status species were entered into the California Natural

Diversity Database (CNDDB), which is maintained by the CDFW. Monthly updates with the most relevant data and key findings were sent to the LTSCC and Caltrans District 5.

5.2 Roadkill Surveys and Data Collection

New and existing roadkill data were collected and put into the Master Database, a database that we have been entering roadkill data into since the 2013-2016 study. These data were used to determine if there were roadkill hotspots where the wildlife routinely attempted to cross the roads within the study area. These data were used to identify travel routes where the animals approached roads. Bi-monthly roadkill surveys were conducted by Pathways for Wildlife. The wildlife-vehicle collision data included GPS locations and photographs and were entered into the Master Database.

6.0 Field Camera Data Analysis

6.1 Species Totals: passages versus non-passages

For the data analysis, the frequency and type of use (investigation, successful passage, and non-passage) of each animal detection were totaled at the wildlife crossing. A total of 1,013 animals were recorded on the camera stations at the wildlife crossing. Among these, there were 934 passages of animals traveling through the crossing and 79 records of non-passages (Chart 1). The species that were recorded on camera using the wildlife crossing to travel under the highway included bobcat, gray fox, black-tailed deer, mountain lion, opossum, and skunk (Figure 14). Among these six species, the species with the highest passage rates was black-tailed deer, with 864 passages. Additionally, there were 56 passages by gray foxes, seven passages by bobcats, four passages by mountain lions, two passages by opossums, and one passage by a skunk (Chart 1).

Species	Passages	Non-passage
Bobcat	7	0
Gray fox	56	5
Black-tailed deer	864	74
Mountain lion	4	0
Opossum	2	0
Skunk	1	0
Grand Total	**934**	**79**

Chart 1. Native species passages versus non-passages.

Figure 14. Species use of the Highway 17 Laurel Curve Wildlife Crossing: mountain lion (upper left), black-tailed deer (upper right), bobcat (lower left), and gray fox (lower right).

Interestingly, the passage rates by the black-tailed deer were very high when compared with those of the other species (Chart 2). This is due to the high use of the wildlife crossing by multiple individuals of deer on a monthly basis. Some individuals also traveled through the crossing on a weekly basis (Figure 8).

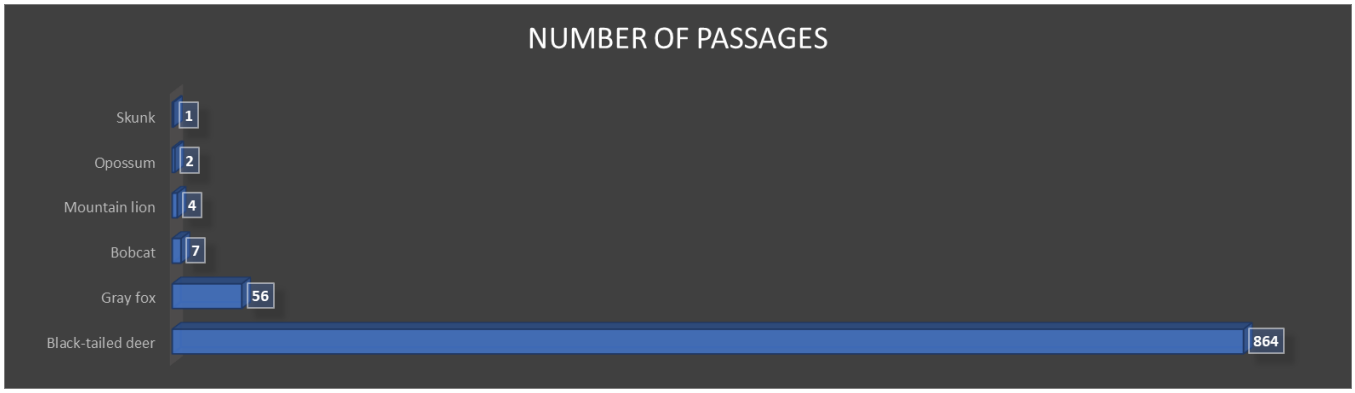


Chart 2. Native species passages.

6.2 Seasonal Variation and Native Species Passages by Month

To determine the number of passages of wildlife that were recorded each month and the length of the period before an increase in the passage rates for each species, the passages were displayed by month and species in Chart 3. Unfortunately, the months of August and October were not included as the cameras were not functional during those months and only recorded approximately one week's worth of data. In August there was a lot of construction activity occurring on the west side of the wildlife crossing, which filled up the SD cards. In October, there was a lot of human activity, which also filled up the SD cards. In terms of the overall successful wildlife passages, from February to April there was a slow increase in the passage rates, ranging from 14 to 29 passages. Then, in May, there was an marked increase in the passage rates to 94 passages. Between June and November, there was a steady increase in the passage rates except for a decrease in the passage rates in July.

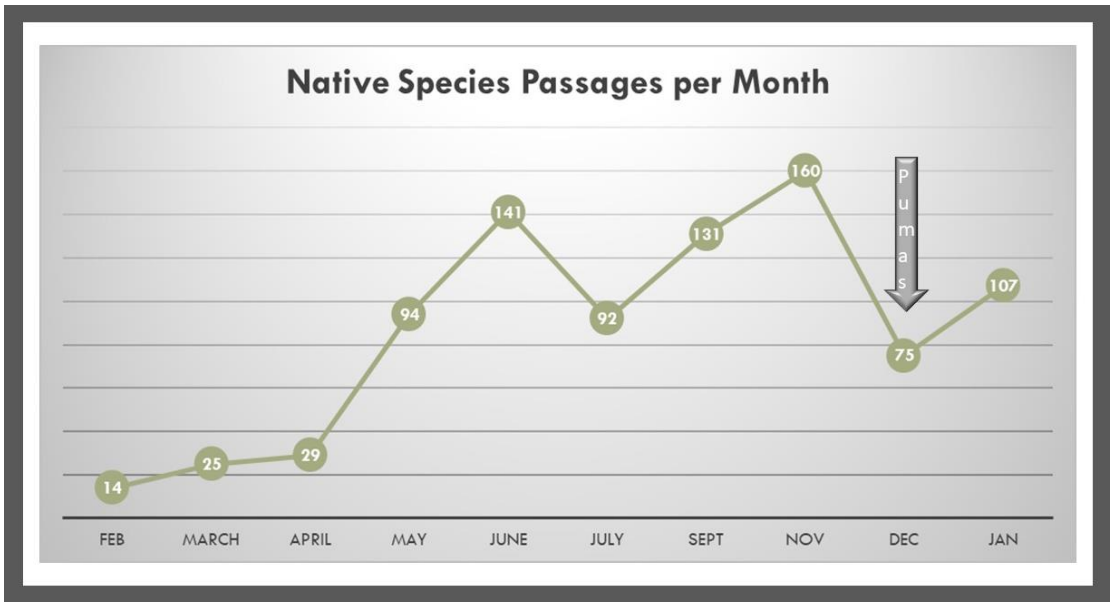


Chart 3. Number of native species per month.

Interestingly, in December, there was a decline in the passage rates, and the lowest number of passages since May was recorded (the beginning of the increase in the passage rates). The species with the highest passage rate was the black-tailed deer. Between November 28, 2023 and the beginning of January 2024, we recorded the first four passages by mountain lions. **Therefore, there may have been a decline in the deer passage rates due to an increase in the mountain lion passage rates and activity on both sides of the wildlife crossing.** Supporting this hypothesis, we did not detect any mountain lion passages or activity on either side of the crossing after 1/2/2024, and there was an increase in the deer passage rates in January (Chart 4).

The rates of passage were displayed by month per species to compare the variation in the passage rates. The black-tailed deer passage rate was the highest in June and November. The gray fox detections drastically declined, with no detections from May to September. Then, in November, there was an increase in the number of gray fox detections.

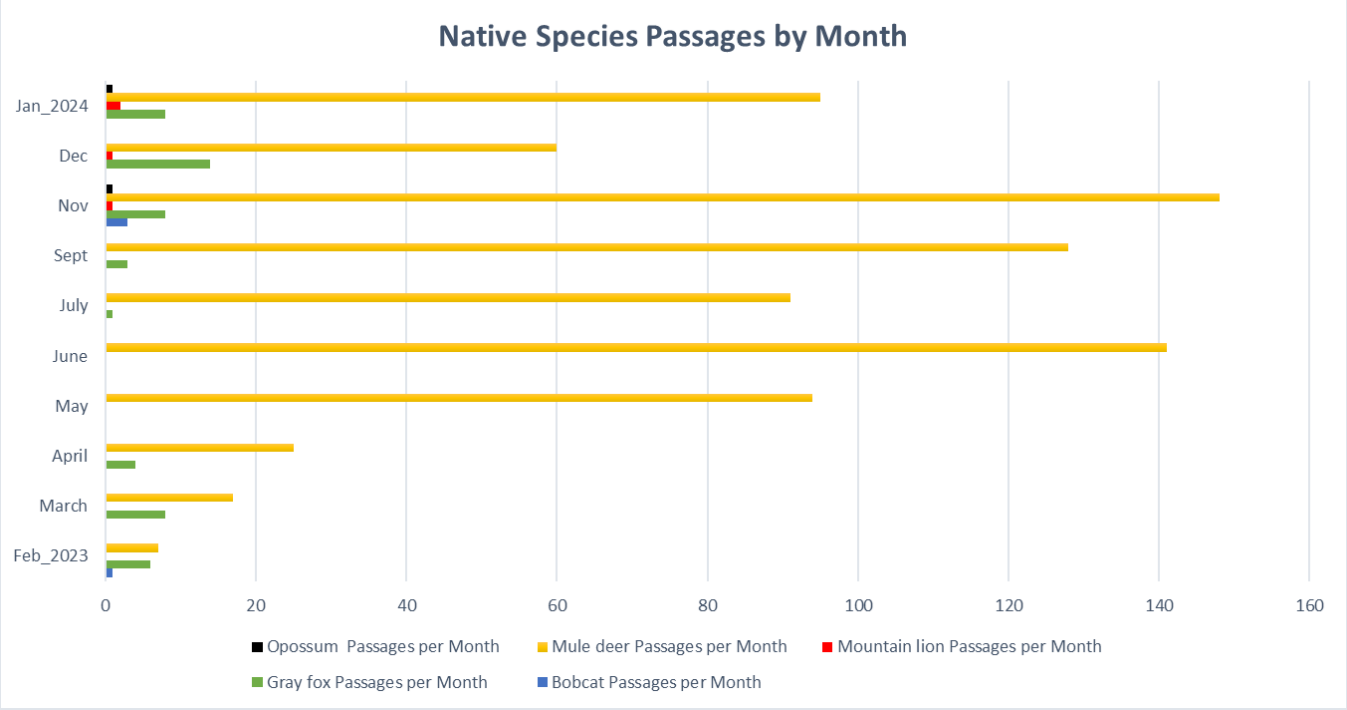


Chart 4. Native species passages by month.

The first bobcat detection was recorded on the day that the cameras were set up on 1/30/2023. However, there were no bobcat passages recorded until November–January 2023, and there was an increase in the passage rates in January. Overall, there was a very low number of mesocarnivores, such as opossums and skunks. Interestingly, no raccoons were recorded using the crossing even though they had previously been recorded as roadkills within the study area during the 2013–2016 study.

Small mammal tracks such as Dusky-footed woodrat tracks were observed within the wildlife crossing, however, the camera study did not document complete passages by species smaller than an opossum.

6.3 Individual Black-tailed Deer Passage Rates

Out of the 864 deer passage records, there were 777 records of deer that we were able to identify as individuals. Additionally, different individual females traveling with juveniles and different bucks were

identified by counting the number of tines within their antler system and based on the tine sizes. There was an increase in the male deer passage rates in November. This could be because of the rutting season when the male deer travel together in the Fall. An increase in the number of individual male deer traveling through the wildlife crossing and male deer traveling together was recorded from late October to November 2023 (Chart 5, Figure 15). In November 2023, a total of five different bucks were recorded traveling through the wildlife crossing. During the summer and fall, juveniles often traveled with their parents, which likely accounts for the increase in passage rates from July to November (Chart 5). Several different female deer were recorded traveling with juveniles. One female deer with two fawns traveled through the wildlife crossing on a weekly basis and even bedded down in the crossing (Figure 15).

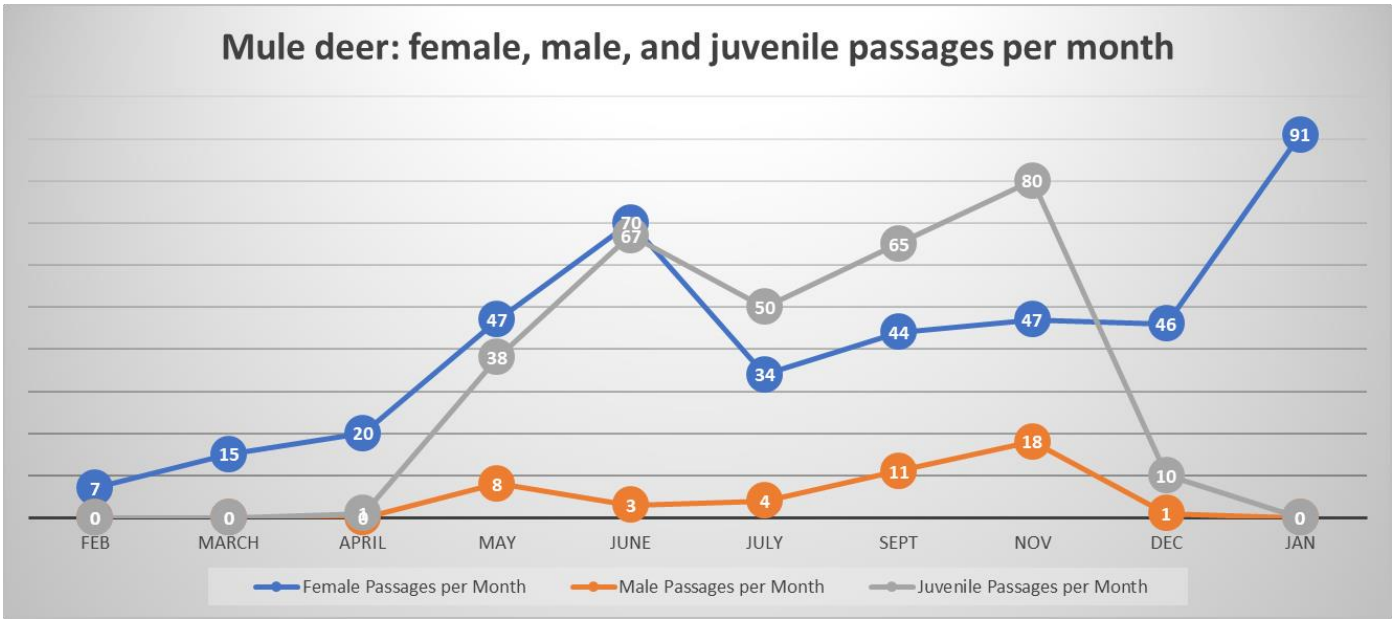


Chart 5. Black-tailed deer female, male, and juvenile passages per month.

Figure 15. Male and female deer at the wildlife crossing.

6.4 Mountain Lion Passages

There were four documented crossings by mountain lions (Chart 6). Based on the camera footage, each crossing was likely conducted by a male mountain lion (Figure 16). The first mountain lion to use the wildlife crossing was recorded on 11/28/2023, and the second record occurred on 12/15/2023. The third and fourth records were observed on the same day on 1/2/2024, where a male mountain lion traveled west through the crossing into Marywood at 2:07 am and then back east into Lions Gate at 9:18 pm.

Date	Species	Sex	Number of Individuals	Crossing (Yes/No)
11/28/2023	Mountain lion	Male	1	Yes
12/15/2023	Mountain Lion	Male	1	Yes
1/2/2024	Mountain Lion	Male	1	Yes
1/2/2024	Mountain Lion	Male	1	Yes

Chart 6. Records of the mountain lion crossings.

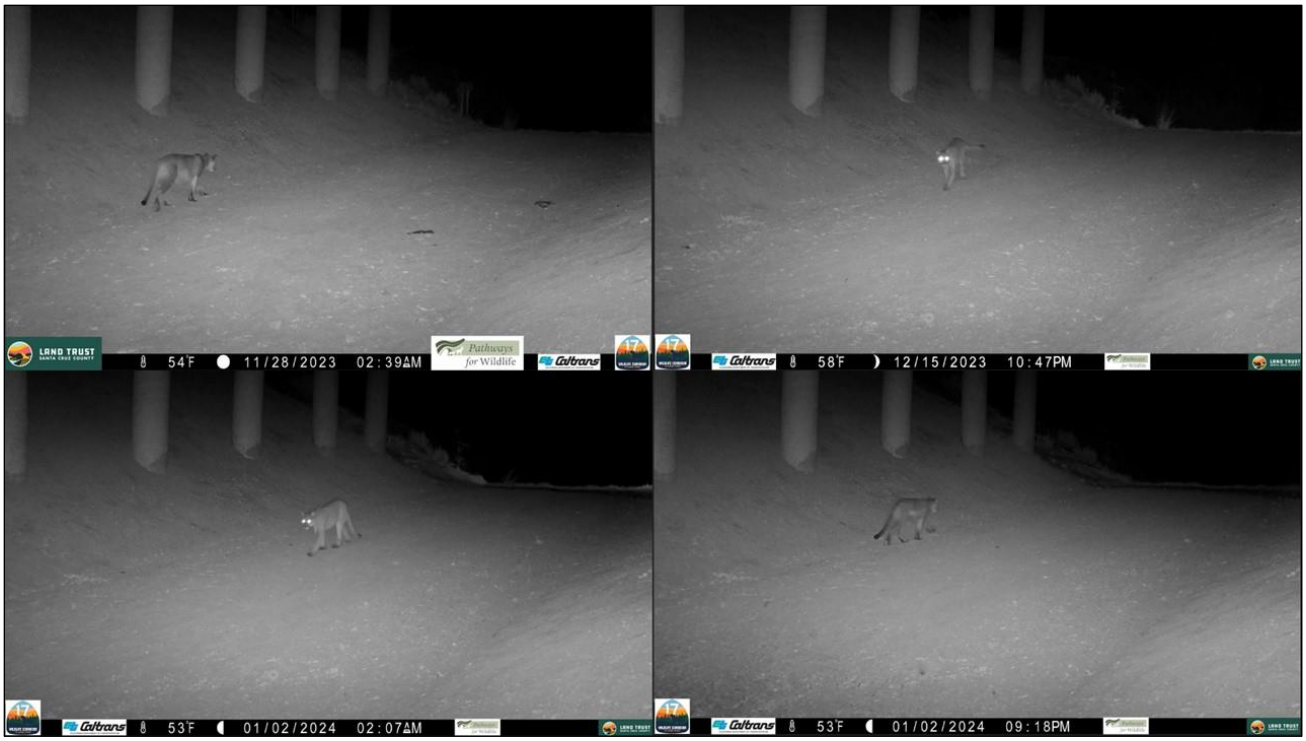


Figure 16. Mountain lion passages at the Highway 17 Laurel Curve Wildlife Crossing.

Interestingly on 11/07/2023, a radio-collared female mountain lion was recorded with three kittens on the west side of the Highway 17 Wildlife Crossing on the Marywood property (Figure 17). One of the study questions entails comparing camera data from the 2013–2016 study to identify species that are not using the structure but that have been previously documented traveling on either side of the crossing.

During the 2013-2016 study, we recorded female mountain lions with kittens on the Marywood property (Figure 12). Recording the radio-collared female with kittens on 11/7/2023 was a great finding in documenting that there is the continuing use of the property by a female mountain lion with kittens. We did not document the female travling through the wildlife crossing with the kittens to date.

Figure 17. Radio-collared female mountain lion with kittens on the west side of the Highway 17 Laurel Curve Wildlife Crossing.

7.0 Roadkill Data Analysis

The roadkill data collected from February 2023 to January 2024 were compared with the baseline roadkill data that were collected from 2013 to 2016. The purpose of this analysis was to determine if the Highway 17 Wildlife Crossing structure, directional fencing, three jump-outs, and electrified mat across the Laurel Road exit were effective in reducing wildlife-vehicle collisions within the study area. From 2013 to 2016, within the entire stretch of Highway 17 in Santa Cruz County, 77 roadkills were recorded, and 34 out of the 77 animals were hit within the Laurel Curve study area. Approximately half of the total data were recorded at the study area. From 2013 to 2016 at the Laurel Curve study site, 26 deer, two mountain lions, two bobcats, one coyote, two gray foxes, three raccoons, and one skunk roadkill were recorded (Figure 18).

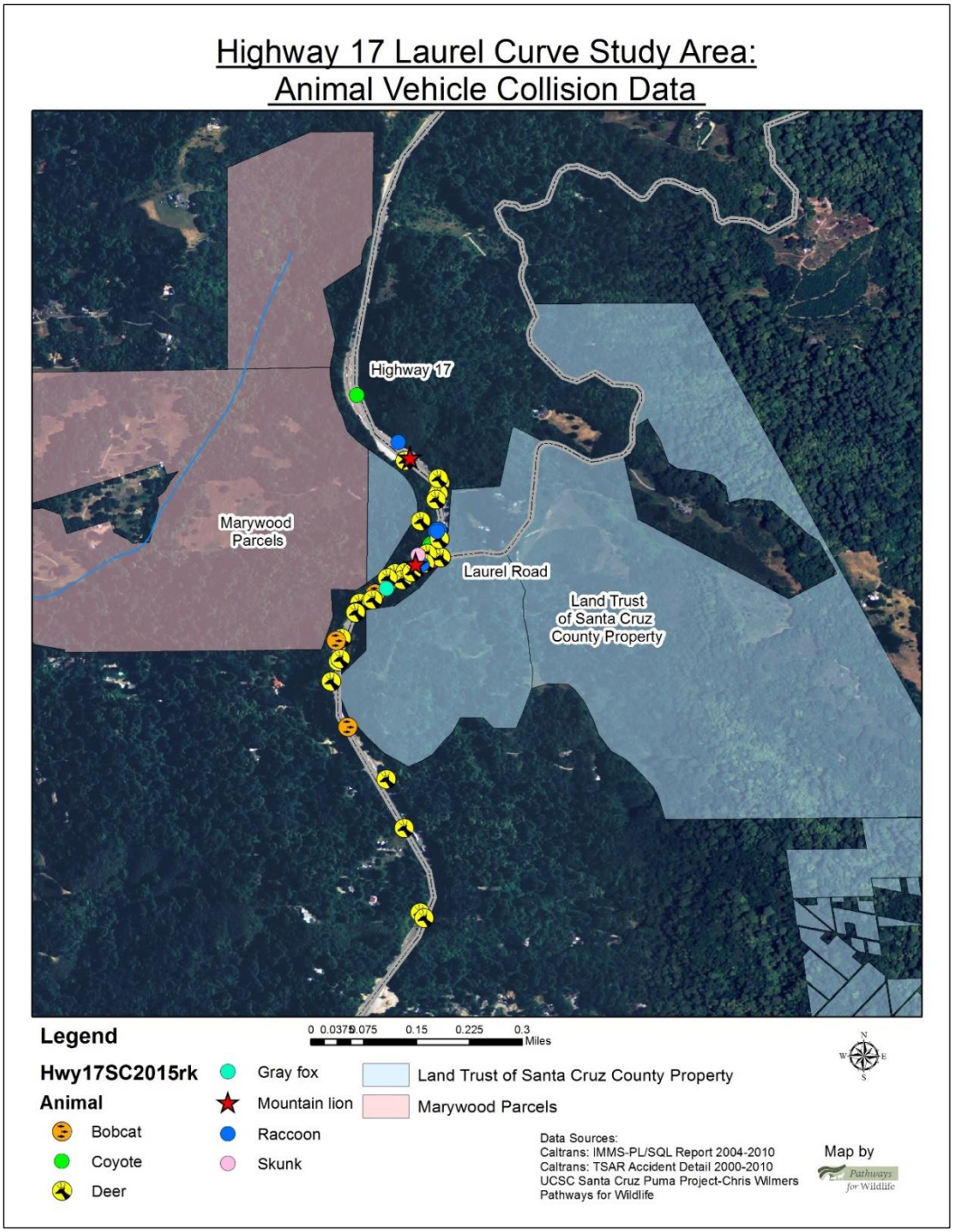


Figure 18. Highway 17 Laurel Curve Roadkill Data: 2013–2016.

Bi-monthly roadkill surveys were conducted to replicate the roadkill surveys that were completed from 2013 to 2016 to compare the results. From February 2023 to January 2024, only one animal was recorded as hit

within the Highway 17 Laurel Curve study area. A sub-adult mountain lion was hit at the end of the directional fencing on the northern side of the study area in the northbound lanes on 4/2/2023 which was approximately 0.38 miles away from the wildlife crossing, at the northernmost extent of the study area (Figures 19 and 20). There is a small ravine leading to the highway where the mountain lion was found. One possible recommendation based on this finding could be to further extend the directional fencing to this ravine area where the mountain lion was hit to mitigate any further collisions. Apart from this mountain lion, there were no other recorded roadkills within the Highway 17 Laurel Curve study area. This was a significant decrease in the wildlife-vehicle collisions when compared with the 2013–2016 data collection, especially for the black-tailed deer. The black-tailed deer roadkills were previously found within the study area throughout the 2013–2016 roadkill surveys (Table 1).

Figure 19. Mountain lion that was found hit on Highway 17 on 4/2/2023.

Figure 20. The location where the mountain lion roadkill (Puma roadkill) was recorded on Highway 17 on 4/2/2023.

Table 1: Roadkill Database: Data collected by Pathways for Wildlife in 2013-2016 and Caltrans in 2004–2006. Hwy 17,

Easting	Northing	From MI	To MI	Date	Animal	Number	Juvenile	Location
590946	4106847	**9.3**	**9.4**	9/13/2013	Bobcat	1		SB just south of Laurel Curve at the median barrier.
590883	4106542	**9.32**	**9.32**	7/22/2015	Bobcat	1		Hit at the median barrier, south of Laurel Curve, northbound.
590286	4110367	12	12	12/8/2013	Coyote	1		NB just north of the top of the Summit.
591075	4106957	**9.44**	**9.44**	Fall 2013	Coyote	1		
590904	4107300			11/22/2015	Coyote	1		Hit at the median barrier just south of Laurel Curve.
586574	4097727	2.3	2.4	1/18/2014	Deer	1		NB 1 mile south of Mt Hermon Road at the median barrier.
591096	4106929	**9.4**	**9.5**	12/13/2013	Deer	1		Fawn was hit on Laurel Road adjacent to Hwy 17 (picture).
590971	4106422	**9**	**9.1**	10/26/2013	Deer	1		SB at Glenwood Cutoff.
590403	4110215	11.8	11.9	9/5/2013	Deer	1		Deer in the middle lane at the top of the Summit.
587073	4095388	0.82	0.82	10/9/2009	Deer	1		
586489	4097454	2.2	2.2	9/26/2009	Deer	1		
				9/25/09	Deer	1		Northbound 17 at the Summit.
587068	4095241	0.74	0.74	5/19/09	Deer	1		Northbound 17 at Pasatiempo, 1st lane.
586575	4097154	2	2	10/2/2008	Deer	1		
587113	4095057	0.61	0.61	5/13/2008	Deer	1		
		0	12.5	10/24/2006	Deer	1		
		0	12.5	10/23/2006	Deer	1		
		0	12.5	10/16/2006	Deer	7		All from PM1 to PM 10.
		0	12.5	10/3/2006	Deer	1		At Sand Pile.
		0	12.5	10/3/2006	Deer	1		At Pasatiempo.
591060	4106927	**9.45**	**9.45**	10/3/2006	Deer	1		At Laurel Curve.
586543	4097620	2.31	2.31	11/15/2005	Deer	1		
		0	12.5	6/1/2005	Deer	1		
		0	12.5	3/14/2005	Deer	1		
		0	12.5	9/10/2004	Deer	1		At Summit Road.
		0	12.5	9/7/2004	Deer	2		
		0	12.55	8/24/2004	Deer	1		At Summit Road.
586605	4097112	1.94	1.94	10/20/2003	Deer	1		
586486	4097435	2.19	2.19	10/4/2002	Deer	1		
586948	4099036	3.254	3.254	12/22/2001	Deer	1		
586801	4096824	1.74	1.74	11/18/2001	Deer	1		
587086	4095152	0.68	0.68	9/25/2000	Deer	1		
591014	4106895	**9.4**	**9.4**	Spring 2013	Deer	1		Female on the west side of the highway.
590910	4106825	**9.4**	**9.41**	Spring 2013	Deer	1		Fawn with a female on the west side of the highway.
591064	4106937	**9.45**	**9.45**	Spring 2013	Deer	1		Fawn
591020	591020	**9.4**	**9.41**	Spring 2013	Deer	1		Female on the east side of the highway.
591008	4106877	**9.39**	**9.4**	Spring 2013	Deer	1		Fawn with a female on the east side of the highway.
591094	4107099	**9.5**	**9.5**	Spring 2013	Deer	1		Fawn
591092	4106970	**9.45**	**9.45**	Spring 2013	Deer	1		Female by the median barrier.
591090	4107074	**9.55**	**9.55**	Fall 2013	Deer	1		Buck-large by Driveway to the Mansion property.
591085	4107061	**9.53**	**9.53**	Fall 2013	Deer	1		Large buck at the median barrier.
591090	4107109	**9.56**	**9.56**	Fall 2013	Deer	1		Large buck at the call box, at the pull-out on the east side of the highway.
591014	4107150	**9.6**	**9.6**	Fall 2013	Deer	1		Large buck
590940	4106832	**9.35**	**9.35**	9/1/2014	Deer	1		Just south of Laurel Curve on shoulder NB.
590974	4106881	**9.38**	**9.38**	6/28/2014	Deer	1		Hit by the viaduct, by pull out at the call box SB.
590845	4106645	**9.18**	**9.18**	7/13/2014	Deer	1		Hit south of Laurel Curve before the Santa Cruz Armory sign SB.
590901	4106804	**9.3**	**9.3**	8/2/2014	Deer	1		Hit southbound at Laurel Curve.
591059	4106915	**9.44**	**9.44**	9/15/2014	Deer	1		Hit in the northbound lane just before Laurel Curve.
590901	4106803	**9.25**	**9.25**	12/2/2014	Deer	1		Male deer hit northbound.
591030	4106895	**9.35**	**9.35**	1/26/2015	Deer	1		Deer hit southbound just past Laurel Curve: pers. comm. Dan Medeiros LTSCC.
591012	4106310	**8.95**	**8.95**	4/15/2015	Deer	1		Hit by the Armory sign, southbound, south of Laurel Curve.
590861	4106691	**9.42**		5/3/2015	Deer	1		Hit south of Laurel Curve, northbound, buck.
589280	4102850	6.1	6.2	9/9/2015	Deer	1		Hit at Vine Road, on the side of the road.
591050	4107012	**9.5**	**9.5**	9/30/2015	Deer		1	Buck at Laurel Curve, by the viaduct.
590866	4106697	**8.2**	**8.2**	10/4/2015	Deer			Large buck hit south of Laurel Curve, close to Scotts Valley SB.
591048	4106117	**9.5**	**9.5**	10/8/2015	Deer	1		Female hit just north of Laurel Curve, NB.
591058	4106104	5.8	5.8	11/14/2015	Deer	1		Hit at the median barrier at the north end of Scotts Valley before Vine Road.
590972	4106858	**9.38**	**9.38**	8/19/2015	Gray fox	1		Hit at the median barrier at Laurel Curve, at Laurel Road, juvenile.
586733	4096924	1.82	1.82	4/1/2004	Livestock	1		
591038	4106914	**9.3**	**9.3**	11/27/2010	Mountain lion	1		16M was hit on Hwy 17 at Laurel Curve and survived.
589259	4102864	6.1	6.2	10/31/2013	Mountain lion	1		39M, a sub-adult male, was struck and killed while crossing Highway 17 early Thursday morning near Vine Hill Road.
590955	4104553	7.7	7.8	8/7/2011	Mountain lion	1		18F was hit on the northbound lane at the intersection of the highway and Jarvis Road.
588368	4101734	5.2	5.2	5/11/2010	Mountain lion	1		South of Granite Creek Road, hit at around 1:30 am in the northbound lane.
591025	4107157	**9.6**	**9.6**	10/30/2014	Mountain lion	1		Hit southbound, across from the Mansion property driveway at Laurel Curve.
		0	12.5	9/17/2006	Pig	1		
		0	12.553	6/3/2008	Raccoon	1		
		0	12.5	9/21/2006	Raccoon	2		
591088	4106988	**9.5**	**9.5**	Fall 2013	Raccoon	1		Hit at the median barrier.
591053	4106912	**9.3**	**9.3**	10/2/2014	Raccoon	1		
590999	4107192	**9.6**	**9.6**	2/23/2015	Raccoon	1		Hit north of Laurel Curve, northbound, at the sign where the mountain lion was hit on 10/30/2014.
591044	4106934	**9.45**	**9.45**	1/20/2015	Skunk	1		
Total animals hit in Santa Cruz Co. on Hwy 17						**77**		
Total animals in the study area on Hwy 17						**34**		

8.0 Jump-out and Directional Fencing Camera Results

There are three jump-outs at the Highway 17 Laurel Curve Wildlife Crossing. There are two jump-outs on the northbound lanes and one jump-out along the southbound lanes. The jump-out located by the Highway 17 Laurel Curve exit, Figure 21, is on the south side of the exit across from the wildlife crossing.

Figure 21. Highway 17 Laurel Curve exit jump-out with exclusionary fencing, south of the wildlife crossing.

Wildlife was recorded traveling on the inside of the jump-out along the fence line, with no records of animals using the jump-out from the highway. There were several records of deer and wild turkeys traveling along the fence line by the jump-out throughout the study period (Figure 22). The fencing seemed to be effective in preventing the deer from accessing the highway.

Figure 22. Deer traveling west at the Highway 17 Laurel Curve exit jump-out, south of the wildlife crossing.

The second jump-out located along the northbound lanes, is located on the north side of the wildlife crossing (Figure 23). Throughout the study period, multiple individuals of deer were recorded traveling both north and south along the jump-outs.

Figure 23. Deer traveling north at the Highway 17 northbound jump-out with exclusionary fencing, north of the wildlife crossing on 2/22/2023.

We recorded one animal using the jump-out from the highway to access the protected property at Lions Gate. A gray fox was recorded using the jump-out on 3-9-2023 to travel from the highway and into the Lions Gate property, which is on the east side of the wildlife crossing (Figure 24).

Figure 24. Gray fox traveling from Highway 17 into the northbound jump-out, north of the wildlife crossing on 3/9/2023.

There is one jump-out located on the north side of the wildlife crossing along the southbound lanes of the highway (Figure 25).

Figure 25. Highway 17 southbound jump-out with exclusionary fencing, north of the wildlife crossing.

Wildlife was recorded traveling on the inside of the jump-out along the fence line, with no records of animals using the jump-out from the highway. There were records of bobcats, deer, gray fox, and skunk traveling along the fence line by the jump-out throughout the study period. We recorded several videos of a female bobcat traveling with a juvenile along the fence line along with a female deer travling with a fawn (Figures 26-28). The fencing seemed to be effective in preventing wildlife from accessing the highway.

Figure 26. Gray fox traveling south along the Highway 17 southbound jump-out on 3/28/2023.

Figure 27. Bobcat with a juvenile traveling south along the Highway 17 southbound jump-out on 4/1/2023.

Figure 28. Deer with a juvenile traveling south along the Highway 17 southbound jump-out on 8/7/2023.

9.0 Electrified Mat Results

As part of the exclusionary fencing design to keep animals of the highway, an electrified mat was constructed and installed at the Highway 17-Laurel Road exit (Figure 29). The purpose of the electrified mat is to literally give animals a non-lethal shock if they step onto the mat to prevent them from accessing the highway from Laurel Road.

The jump-out is strategically placed just west of this electrified mat for animals that might have access to the highway and are trying to travel into the Lions Gate property on the east side of the highway. Since the purpose of the electrified mat is to prevent animals from entering or leaving the Laurel Road exit, the jump-out is available for animals that are within the highway to be able to access the Lions Gate property. There were no documented cases of animals approaching or attempting to cross the electrified mat.

Figure 29. Electrified mat at the Highway 17 Laurel Curve exit.

10.0 Discussion on the Effectiveness of the Wildlife Crossing

The combination of the camera and roadkill data demonstrated that the Highway 17 Wildlife Crossing, directional fencing, three jump-outs, and electrified mat across the Laurel Road exit were effective in reducing wildlife-vehicle collisions within the study area. There was only one animal, a young mountain lion, recorded as roadkill, which was approximately 0.38 miles away from the wildlife crossing, at the most northern extent of the study area. No other species were recorded as being hit within the study area.

During the 2013–2016 study, 26 deer were recorded as hit by vehicles on Highway 17 within the Laurel Curve study area. However, there were no documented deer wildlife-vehicle collisions during the first year of post-construction roadkill surveys. This preliminary data indicates that the wildlife crossing and its design features are effectively reducing deer mortality due to motor vehicle collisions. In support of this, multiple deer individuals were recorded using the wildlife crossing on a weekly basis. The combined results of the roadkill surveys and the camera trap surveys demonstrate that the wildlife crossing is facilitating a high number of deer passages and reducing wildlife-vehicle collisions. Thus, it has made the highway safer for both wildlife and vehicle drivers.

11.0 Improvements that Increased the Permeability at the Wildlife Crossing

On 7/19/2023, Chris Wilmers joined Pathways for Wildlife on a site visit at the Highway 17 Wildlife Crossing. A significant issue was identified on the west side of the wildlife crossing where a fire road leading up to the base of the crossing had become completely overgrown by dense invasive vegetation. Chris Wilmers suggested that the invasive vegetation could be removed to better facilitate wildlife movement up to the wildlife crossing.

Until that date, no mountain lions had been recorded using the wildlife crossing or traveling along the fire road. However, before the crossing was built we recorded multiple individuals, including a female mountain lion with three kittens, traveling along the fire road during the 2013–2016 study (Figure 12). In December 2023, the LTSCC organized a volunteer event, where 20 volunteers removed the invasive vegetation, which included large patches of dense French broom (*Genista monspessulana*).

Interestingly, there was an increase in the number of female deer and mountain lion passages in January (Charts 4, 5, and 6). This indicates that the removal of the invasive vegetation likely improved the ability of wildlife to access the west side of the wildlife crossing.

12.0 Acknowledgements

We would like to thank our amazing project partners at the Land Trust of Santa Cruz and Neal Sharma at the Wildlife Conservation Network for funding and supporting this study. We would also like to thank Caltrans District 5 and Nancy Siepel for their incredible work and conservation efforts in putting together the first statewide mitigation agreement with the CDFW to fund the construction of the wildlife crossing. We are also deeply grateful to the CDFW and the Regional Transportation Commission of Santa Cruz County for their collaboration, which helped make this project possible.

We would also like to thank Chris Wilmers at the UCSC Puma Lab for his expertise in reviewing the results and for providing the mountain lion collar data. Without these partnerships, this project would not have been possible.

Photo: Land Trust of Santa Cruz, Caltrans, Wildlife Conservation Network, and Pathways for Wildlife observing wildlife tracks within the Highway 17 Wildlife Crossing Structure while setting up the field cameras on January 30th, 2023.

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