# Recommendations to reduce wildlife-vehicle collisions on the Monterey Road corridor in Coyote Valley, Santa Clara County




Santa Clara County Wildlife Corridor Technical Working Group
Coyote Valley Subcommittee

APRIL 2019

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Cover photos by Pathways for Wildlife (Monterey Road), Bob Gunderson (coyote, black-tailed deer), cc Jack Wolf (jackrabbit), and USFWS Pacific Southwest Region (bobcat). Photos on opposite page and back cover (Monterey Road) by Pathways for Wildlife.

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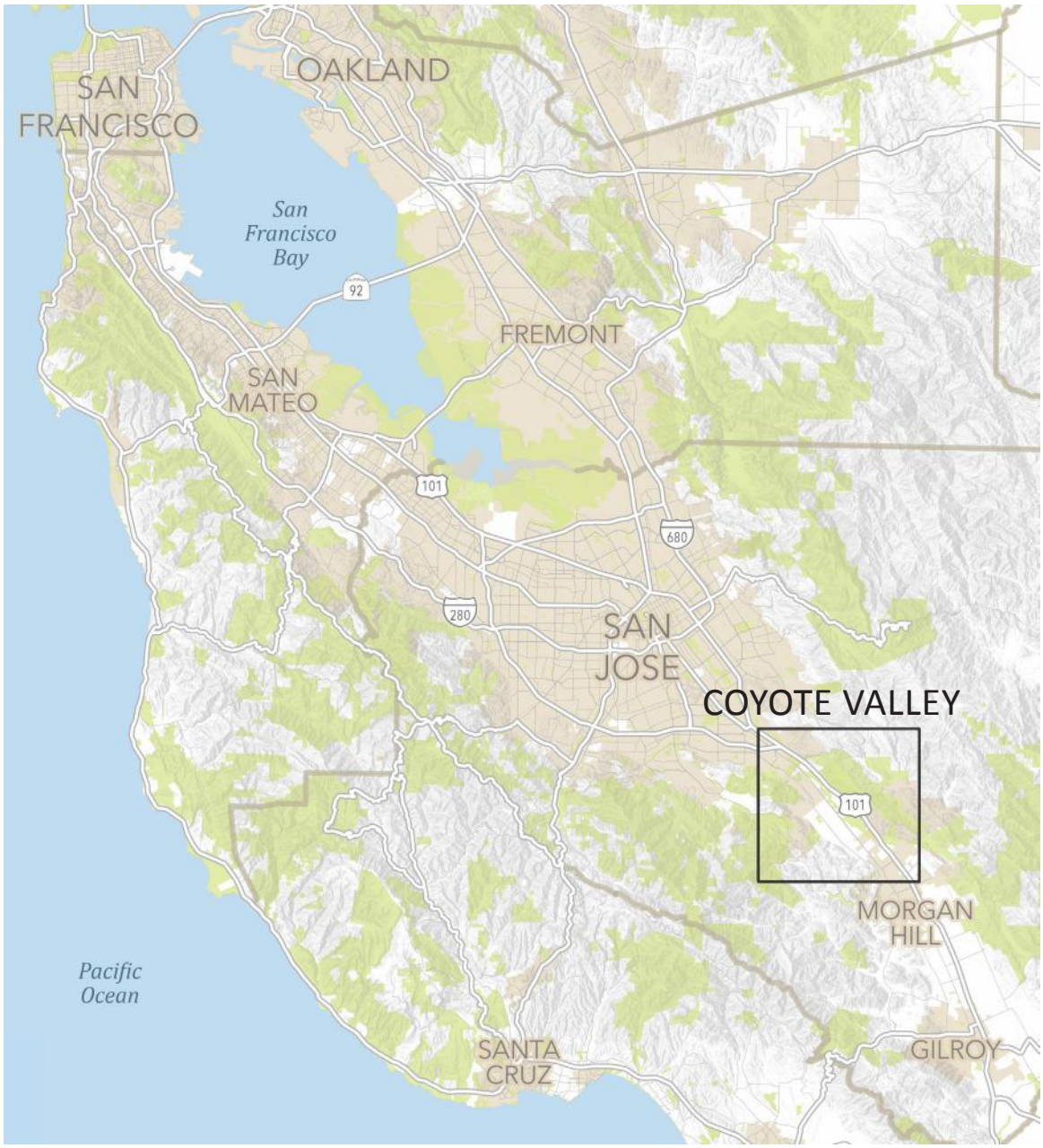
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# EXECUTIVE SUMMARY

Coyote Valley is a 7,400-acre greenbelt between the Cities of San José and Morgan Hill, consisting primarily of agricultural lands and open space, with some commercial and residential development. Numerous scientific assessments have identified Coyote Valley as an area of tremendous regional significance for conservation and climate resilience, due in large part to the rare habitats that survive there and its role as an irreplaceable and unique opportunity to functionally connect the biodiversity (especially wildlife populations) of the Santa Cruz Mountains with the Diablo Range (Thorne *et al.* 2006; Spencer *et al.* 2010; Penrod *et al.* 2013).

Experts have long recognized that conservation of wildlife movement corridors and landscape linkages is important to support healthy and resilient ecosystems and plant and wildlife populations, particularly in the face of a changing climate.

The Coyote Valley Subcommittee of the Santa Clara County Wildlife Corridor Technical Working Group has studied the impacts of wildlife-vehicle collisions along Monterey Road in Coyote Valley. Roadkill data indicate that the Monterey Road corridor is the area's leading contributor to wildlife-vehicle collisions. Surveys along Highway 101, Monterey Road, Santa Teresa Boulevard, and Bailey Avenue show that more than 63% of all roadkill was on Monterey Road, more than 5x the number of roadkill documented on any other road within the focus area. Of the documented roadkill on Monterey Road, 78% was within the section that runs between Metcalf Road and Bailey Avenue (Diamond and Snyder 2018).

This report makes recommendations for wildlife crossing improvements and infrastructure to reduce these collisions, increase the permeability of Monterey Road for wildlife movement, and address an acute issue that poses a threat to landscape-scale conservation efforts in the South Bay and more broadly throughout the region. These recommendations are informed by data from local research, scientific literature, relevant case studies, and expert opinion:

- **Installation of roadway signs and reduced speed limit.** Signs that alert drivers about wildlife crossing areas can influence driver awareness and behavior. Lower speeds provide drivers with additional time and distance to react to wildlife. (The City of San José installed two signs along Monterey Road in November 2018. Installation of an additional sign is recommended, for northbound traffic entering Monterey Road from Bailey Avenue.)
- **Modifications of the median barrier.** Reducing the height and length of the barrier, increasing the number and spacing of gaps, and replacing some or all of the barrier with a design that is more permeable for wildlife will make it easier for wildlife attempting to cross the road at-grade, reducing entrapment and collisions.
- **Improvement of the Fisher Creek culvert as an undercrossing.** Retrofitting the existing culvert at Fisher Creek, which was not designed for wildlife but provides safe passage for some species, will help keep wildlife off roads by offering a safe undercrossing.
- **Creation of wildlife crossing infrastructure.** Construction of wildlife infrastructure at key locations, including Tulare Hill, Emado Avenue, and Bailey Avenue, will provide safe alternatives to at-grade crossing, and accommodate the ranges and habitat needs of various wildlife species.

These recommendations present an opportunity for continued collaboration between the City of San José and interested stakeholders to reduce wildlife-vehicle collisions on Monterey Road. Implementation of these measures will improve the long-term local and regional resilience of wildlife populations and associated ecological processes.

# AUTHORS AND ACKNOWLEDGEMENTS

This report was prepared by the Coyote Valley Subcommittee of the Santa Clara County Wildlife Corridor Technical Working Group:

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The Santa Clara County Wildlife Corridor Technical Working Group is an information-sharing forum consisting of representatives of agencies and organizations involved in efforts to improve habitat connectivity and increase landscape permeability. The group includes staff from the Santa Clara Valley Water District, Santa Clara Valley Open Space Authority, Santa Clara Valley Transportation Authority, Santa Clara Valley Habitat Agency, POST, Santa Clara County Parks, Pathways for Wildlife, California Department of Fish and Wildlife, US Fish and Wildlife Service, Land Trust of Santa Cruz County, The Nature Conservancy, De Anza College, California High-Speed Rail Authority, California Department of Transportation (Caltrans), Committee for Green Foothills, Land Trust of Santa Clara Valley, H.T. Harvey & Associates, Midpeninsula Regional Open Space District, San Francisco Bay Bird Observatory, Santa Clara County Planning Department, Sempervirens Fund, Bay Area Open Space Council, University of California, Berkeley, and the University of California, Santa Cruz.

The authors of this assessment recognize and appreciate the many years of research into Coyote Valley's wildlife populations that preceded and informed this report, as well as the commitment and leadership demonstrated by members of the community, elected officials, and other stakeholders throughout the City of San José and Santa Clara County.

# KEY TERMINOLOGY

**At-grade**

On the same level (e.g. on the same surface as vehicular travel).

**Crossing infrastructure**

A physical structure, such as an overcrossing or undercrossing and directional fencing that facilitates landscape connectivity and wildlife movement across barriers such as a road and/or railway.

**Connectivity**

The degree to which a landscape facilitates ecological processes and/or movement by ecological communities and specific plants and wildlife; the antithesis of habitat fragmentation.

**Corridors and linkages**

**Corridors** are distinct, commonly linear features whose primary function is to connect two or more significant (or core) habitat areas (Beier and Loe 1992). Corridors can be naturally occurring, or designed to facilitate the movement of selected wildlife species (wildlife corridors) or to accommodate diverse guilds of plants, animals, and ecological processes.

**Landscape linkages** are broad areas that support natural ecological processes and allow gene flow of wildlife and plant species to move among areas of suitable habitat (Ament *et al.* 2014). Functional landscape linkages provide landscape connectivity (see definition above), with characteristics and scale that can:

- Support historical ecological processes and resilience by allowing all organisms to complete life cycles naturally and ensure gene flow within a regional biome.
- Contain wildlife corridors, which vary based on species needs.
- Allow for daily travel by animals throughout their home ranges (the area an animal travels to meet its daily needs).
- Accommodate migration (or periodic, round-trip movements by wildlife) to support their life history needs (e.g. breeding, dispersal, capture of food).
- Support dispersal of individuals, allowing for the continued maintenance of demographic connections among populations and supporting genetic diversity, which prevents the negative consequences of genetic bottlenecks and inbreeding. In some cases, it is important and necessary for individuals to use landscape linkages to recolonize areas where local extinctions have occurred (Beier and Noss 1998; Hilty *et al.* 2006; Groom *et al.* 2006).
- Allow species and populations to adapt to climate change by providing routes (usually along environmental gradients) that facilitate necessary range shifts. Without these landscape linkages, populations could easily become isolated and eventually extirpated from local environments.

**Habitat fragmentation**

The result of the loss of ecosystem function in a specific geographic area which damages the ability of an area to provide historical (i.e. fully functional) levels of habitat value. Most commonly seen as direct loss of habit, breaking large, connected areas of habitat into smaller disconnected patches, but which can also be the result of indirect activities such as increased light or noise, introduction of non-native species, and/or pathogens or other factors.

**Movement barrier**

A physical obstruction or discontinuity in habitat – such as a major road, railway, or impassable fence or median barrier – that prevents all or nearly all movement by a particular species or ecosystem process (e.g. predator-prey relationship) and can isolate plant or wildlife populations on either side.

**Passage**

The action of wildlife moving between habitat patches using wildlife corridors or the movement of genes over multiple generations of less mobile species.

**Permeability**

The relative ease with which organisms can move from one habitat area to another.

**Riparian corridor**

The areas in and along creeks, streams, and rivers, often occupied by vegetation, that provide cover, facilitate movement of aquatic and terrestrial species, and promote ecological processes and flows, such as movement of sediment, water, and nutrients.

Definitions compiled from Sonoma Land Trust (2014) and
Santa Clara Valley Open Space Authority and Conservation Biology Institute (2017).

# 1 INTRODUCTION

*"Coyote Valley is a last chance landscape. The Valley is situated in one of the world's top 25 most important biodiversity hotspots (the San Francisco Bay Region) and one of the six most important conservation areas in the US. (Stein* et al. *2000). Coyote Valley is a conservation focal area of tremendous significance. It has been identified by the scientific community as an irreplaceable and unique opportunity to functionally connect the biodiversity (especially wildlife populations) of the Santa Cruz Mountains with the Diablo Range (Thorne* et al. *2006; Spencer* et al. *2010; Penrod* et al. *2013)."*

– *Coyote Valley Landscape Linkage: A Vision for a Resilient, Multi-benefit Landscape*. Santa Clara Valley Open Space Authority, San José, CA.

## COYOTE VALLEY

Coyote Valley is a 7,400-acre area between San José and Morgan Hill, consisting of primarily open space and agricultural lands, with some commercial and residential development throughout. Coyote Valley is a significant landscape for long-term ecosystem function and climate resilience in the San Francisco Bay Area, serving as an essential habitat connection between two large habitat areas of the Santa Cruz Mountains and the Diablo Range. Plant communities and wildlife depend on this linkage for migration, to find mates, and maintain genetic diversity – particularly in response to climate change (Santa Clara Valley Open Space Authority and Conservation Biology Institute 2017).

The level of development in Coyote Valley generally increases from north to south, with the south valley having the greatest concentration of buildings, smaller agricultural and other business operations, and parcelization. The north Coyote Valley is recognized as having particularly high conservation value, as it includes rare ecological features such as the Laguna Seca wetland complex, Tulare Hill, and valley floor habitat (Santa Clara Valley Open Space Authority and Conservation Biology Institute 2017).

Monterey Road, which runs north-south through the entirety of Coyote Valley (Figure 1), is a well-documented barrier to wildlife movement in this ecologically significant region (Penrod *et al.* 2013; Diamond and Snyder 2018a). The existing physical characteristics of Monterey Road present challenges for wildlife attempting to cross (Diamond and Snyder 2016). With the exception of the Fisher Creek culvert, there are no entirely safe opportunities for wildlife to travel across the road. The existing median barrier, which includes an anti-glare fencing extension, impedes the ability of wildlife to successfully cross-at grade. This can lead to entrapment and increased risk of wildlife-vehicle collisions.

Roadkill surveys conducted on Highway 101, Bailey Avenue, Santa Teresa Road, and Monterey Road show that more than half of the documented roadkill in this region is along the section of Monterey Road between Bailey Avenue and Metcalf Road (Diamond and Snyder 2018a). This same area, north Coyote Valley, is recognized as an area of particularly high conservation value (Santa Clara Valley Open Space Authority and Conservation Biology Institute 2017).

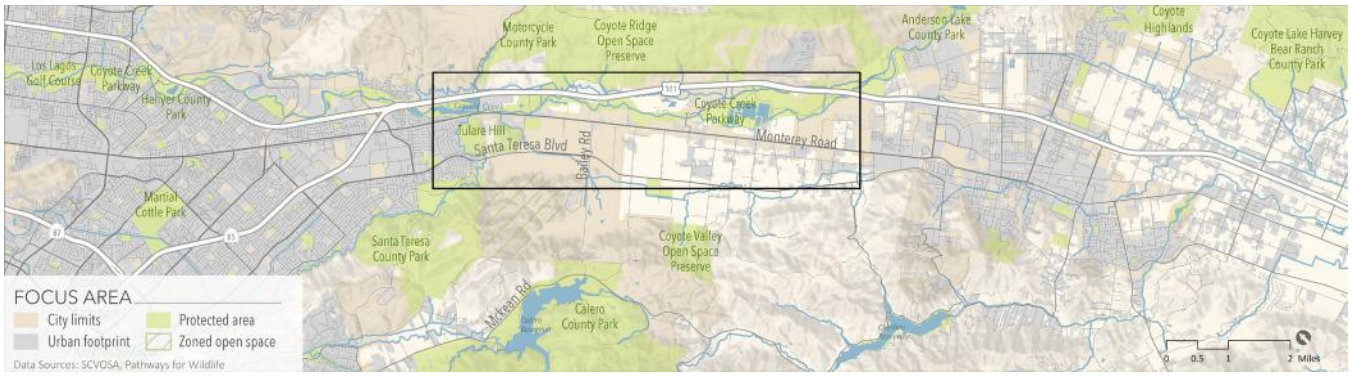



**Figure 1** • Focus area: The Monterey Road corridor through Coyote Valley.

With the goal of identifying opportunities for reducing wildlife-vehicle collisions and making the Monterey Road corridor more permeable to wildlife, the Coyote Valley Subcommittee of the Santa Clara County Wildlife Corridor Technical Working Group studied local research, scientific literature, and relevant case studies, in order to inform the recommendations in this report.

## THE IMPORTANCE OF ECOLOGICAL CONNECTIVITY

Ecological connectivity is a fundamental principle in the conservation of wildlife, ecosystems, and the native biodiversity they comprise (Crooks and Sanjayan 2006). Linkages that connect habitats are critical as they provide a means for sustaining the ongoing viability of regional ecosystems and the life cycles of the organisms within them. Examples include, but are not limited to the ability for species to access food and water (Soulé and Gilpin 1991), offspring to establish their own home ranges (Beier 1995), and to find mates (Hilty *et al.* 2006). As the Bay Area becomes increasingly fragmented due to development, these linkages are severed, and wildlife become isolated from these resources and each other. Conservation of remaining habitat and linkages is necessary to sustain wildlife populations and prevent local extinctions (Soulé and Terborgh 1999).

As urban development increases, habitat is reduced and can support fewer individuals. Particularly when coupled with habitat fragmentation, this can lead to negative genetic effects such as inbreeding (Hilty *et al.* 2006). Inbreeding can result in reduced fertility, increased birth defects, and increased recessive genetic diseases. Compounded with reduced habitat availability, a population may go locally extinct. Apex predators such as mountain lions, with low population density and large home ranges, are particularly vulnerable to impacts of habitat fragmentation and isolation (Stier *et al.* 2016). Decline in top predators is a cause for concern, given the fundamental role that they can play in ecosystem functioning, disease regulation, and biodiversity maintenance (Stier *et al.* 2016).

As natural communities respond to climate change, wildlife need to be able to travel between core habitats to access areas of refuge, find food and water, and/or move into different habitats as the landscape changes over time. More importantly, overall ecosystem resilience depends upon the ability of habitats to colonize new areas as historical areas become unusable. Connectivity is fundamental to the survival and resilience of natural communities across species and guilds (Noss *et al.* 1999; Heller and Zavaleta 2009; Benson *et al.* 2016). As such, it is important that conservation and climate change planning efforts at local and regional scales include critical wildlife linkages, including addressing the barrier effect of roads.

# WILDLIFE AND ROADS

Roads have increasingly fragmented (and continue to fragment) North America's landscapes (Ritters and Wickham 2003) and constitute one of the greatest threats to maintaining landscape connectivity and conservation of biodiversity (Lee *et al.* 2012). In addition to the potential to sever gene flow, the primary effects of roads on wildlife include habitat loss, degradation, and fragmentation, direct mortality, and road avoidance behaviors (Forman and Alexander 1998). The road itself reduces habitat available to wildlife, and may contribute additional impacts due to street and vehicle lights, median barriers, changes in roadside vegetation, and garbage. These habitat degradations influence wildlife's ability or interest in crossing the road. If successful crossing is possible at-grade, it comes with increased risk of mortality.

These negative effects are compounded when the impact extends beyond an individual to the regional population level. When roads create significant barriers to wildlife movement, they can lead to genetic isolation (Beckman *et al.* 2010) and reduced population health (Forman *et al.* 2003). There is evidence that roads are likely already impacting wildlife populations in Santa Clara County. For example, the mountain lion (*Puma concolor*) population in the Santa Cruz Mountains has been found to exhibit low genetic diversity, which may be attributed in part to habitat loss and highways creating a barrier to animal movement and genetic exchange among populations in the Santa Cruz Mountains, Gabilan Range, and Diablo Range (Ernest *et al.* 2003; Gustafson *et al.* 2018). Another local study found genetic differentiation between ground squirrels on either side of US Highway 101 (Gray 2017), suggesting that roads are acting as an effective barrier to gene flow within California ground squirrels in Coyote Valley – and likely other taxa as well.

**Bobcat kill on Monterey Road.** Photo by Pathways for Wildlife.

In addition to the impacts on wildlife, wildlife-vehicle collisions also have a direct and substantial human cost. A national study estimated that each year in the US, there are between one and two million collisions between vehicles and large animals, resulting in approximately 26,000 injuries to drivers and/or passengers annually (Huijser *et al.* 2007a; Huijser *et al.* 2008, Huijser *et al.* 2009). The financial costs of these collisions include medical care, vehicle repairs, and law enforcement and emergency response (Huijser *et al.* 2008).

# PLANNING AND POLICIES

Several state and regional plans identify Coyote Valley as a vital linkage for wildlife, including the California Essential Connectivity Project (Spencer *et al.* 2010), the Conservation Lands Network (Bay Area Open Space Council 2011), and the Bay Area Critical Linkages Project (Penrod *et al.* 2013).

Conservation in Coyote Valley is discussed in a number of plans and policies, several of which include issues relating to Monterey Road acting as a barrier to wildlife movement:

**Envision San José 2040**, the City of San José General Plan, recognizes that Coyote Valley serves as a landscape linkage between the Santa Cruz Mountains and the Diablo Range. Wildlife studies prepared to support the General Plan recommended, "On-going acquisition and preservation of strategic lands by either public or non-profit agencies can further promote beneficial connectivity between [these] wildlife habitat areas" (H.T. Harvey & Associates 2009). The General Plan includes a number of goals and policies related to natural communities and wildlife habitat protection that support the planning and implementation of a "multi-benefit" landscape linkage across Coyote Valley. These goals reflect the City's recognition of the need for, "… multiple jurisdictions to cooperate in the management of natural communities and wildlife habitat. Recognizing this interdependence, San José seeks to demonstrate environmental leadership through advocacy and cooperative efforts with other jurisdictions."

Relevant policies include:

- ER-2.1: Ensure that new public and private development adjacent to riparian corridors in San José are consistent with the provisions of the City's Riparian Corridor Policy Study and any adopted Santa Clara Valley Habitat Conservation Plan/Natural Communities Conservation Plan (HCP/NCCP).
- ER-7.2: In areas important to terrestrial wildlife movement, design new or improve existing roads so that they allow wildlife to continue to move across them (e.g., either over the road surface or through under-crossings or over-crossings designed for the animals moving through the areas).
- ER-7.4: To facilitate the movement of wildlife across Coyote Valley, work with the appropriate transportation agencies to replace portions of the median barrier on Monterey Road with a barrier that maintains human safety while being more permeable to wildlife movement and implement other improvements to benefit wildlife movement.
- ER-7.5: Support the ongoing identification and protection of critical linkages for wildlife movement in the Mid-Coyote Valley.

As part of San Jose's **Vision Zero** transportation safety initiative, a focus is being placed on the 17 major streets identified and established as "Priority Safety Corridors," including Monterey Road. While the Priority Safety Corridors represent only 3% of San Jose's approximate 2,400-mile roadway system, they experience a higher incidence of fatalities and severe injuries due to traffic collisions. This initiative aims to eliminate fatalities and reduce severe injuries caused by traffic collisions. Although there is no known analysis regarding the relationship, if any, between wildlife-vehicle collisions on overall collisions on Monterey Road, research has shown that wildlife-vehicle collisions can be costly to society (Huijser *et al.* 2008) and that mitigations such as wildlife crossing structures have been proven in reducing wildlife-vehicle collisions (Huijser and Clevenger 2011).

**The Santa Clara Valley Habitat Conservation Plan/Natural Communities Conservation Plan (Habitat Plan** [ICF 2012]) is designed to "protect, enhance, and restore ecosystem integrity and functionality for threatened and endangered species; enhance the diversity of plant and animal communities; and conserve habitat and contribute to the recovery of species listed or likely to be

listed under the federal ESA [Endangered Species Act] or the California ESA" (ICF International 2012). As a Co-Permittee and Governing Board member, the City of San José is responsible for successful implementation of the Habitat Plan. The Habitat Plan identifies the Coyote Valley linkage as one of three focus areas critical to meeting regional connectivity goals. The Habitat Plan requires implementation of several conservation actions to protect and improve this linkage including:

- Land acquisition west and east of Coyote Creek
- Habitat restoration of the valley floor to benefit rare and endangered species
- Replacement or upgrade of key culverts and bridges to improve access to Coyote Creek
- Removal of median barriers and installation of directional fencing to reduce roadkill
- Funding for targeted studies to inform land acquisition, restoration, and enhancement actions

**The Santa Clara Valley Greenprint** (Santa Clara Valley Open Space Authority 2014) is a 30-year roadmap for the Santa Clara Valley Open Space Authority's goals, priorities, and strategies for land conservation in Santa Clara Valley. Coyote Valley is identified as one of ten of the Open Space Authority's conservation focus areas and as an area critical for wildlife movement. Coordination with transportation agencies on projects to enhance wildlife movement across road barriers is one of the strategies identified in the Greenprint.

**Coyote Valley Landscape Linkage: A Vision for a Resilient, Multi-benefit Landscape** (Santa Clara Valley Open Space Authority and Conservation Biology Institute 2017) makes some specific recommendations for wildlife crossings of Monterey Road:

- Improve wildlife permeability of existing infrastructure: Improve permeability of existing infrastructure, such as cleaning of culverts, removing the Monterey Road median barrier, and installing road crossing signs. The coordination of this work should be organized through the Santa Clara County Wildlife Corridor Technical Working Group.
- Plan, design, and implement additional wildlife crossings and make significant improvements to existing infrastructure: Install or redesign wildlife crossings in key locations as a component of landscape-scale restoration and management planning. Some existing infrastructure needs significant design and engineering (such as the Monterey Road culvert at Fisher and Coyote Creeks, or widening the Bailey overpass). New wildlife crossings will need to be designed and engineered to ensure multiple passage opportunities for all taxonomic guilds. Planning for new infrastructure for wildlife is a major undertaking and should follow the models of multiple agency partnerships, including the High-Speed Rail Authority, Valley Transportation Authority, Santa Clara County Parks, Caltrans, and local conservation and open space agencies, as has been modeled at other successful wildlife crossing projects in the Bay Area and across the state.

**Santa Clara Valley Water District Safe, Clean Water and Natural Flood Protection Program** (Santa Clara Valley Water District 2012) - **Priority D: Restore Wildlife Habitat and Provide Open Space - Project D2: Revitalize Stream, Upland and Wetland Habitat** allows the SCVWD to remove non-native, invasive plants and revegetate habitat with native species when needed. Funding also restores degraded habitat between revegetated sites to create a more contiguous habitat corridor for wildlife. This project includes targeted control of especially damaging non-native, invasive plant species such as Arundo donax, and education for nearby landowners and other stakeholder groups on the control of harmful species.

**SCVWD One Water Plan** is the SCVWD's approach to integrated water resources management. The standardized approach compares competing and complementary water functions and helps long range planning for the SCVWD's flood risk reduction, stream stewardship, and water supply functions. This effort is organized as a framework and five focused watershed-scale plans with prioritized portfolios of projects. Since One Water is built on science-based objectives, metrics,

and targets, and builds in elements of resilience, any proposed projects should show a measurable improvement in watershed conditions. With consideration of water supply, flood protection, water quality, and ecological resources, One Water also looks to highlight areas of collaboration and partnership. One such example is coordination with the Santa Clara Valley Open Space Authority in the Coyote Valley area of south San Jose, where potential restoration, flood risk reduction, and wildlife corridor crossing improvements are all being discussed.

**The County of Santa Clara Parks and Recreation Department** operates over 52,000 acres of open space and parklands. The County of Santa Clara, Parks and Recreation Department 2018 Strategic Plan (County of Santa Clara, 2018) is the guiding document for the sustainment of parklands for the enjoyment, education, and inspiration of this and future generations. Nine strategic goals were identified during the planning process to achieve the Department's vision. Together, these goals provide a comprehensive ideal for management of the Department and the stewardship for the natural, cultural, and historic resources under its care. The Department is committed to protect natural resources in the context of the greater region (Goal #1 of the 2018 Strategic Plan) by cooperating with regional partners and taking a landscape-level approach to natural resource management and land acquisition, including working to ensure the viability of critical habitat linkages. Protecting and managing critical habitat linkages are vital to managing natural resources at a landscape-level. To meet the goal of protecting natural resources, the Department strives to actively participate in regional efforts to unify and prioritize natural resource management actions (Strategy 1.1 of the 2018 Strategic Plan). In addition, the Department prioritizes land acquisition, planning, and management according to scientific evidence and data about important habitat and connecting ecological systems, specifically by working with others to protect priority habitat linkages through management actions and advocacy within identified priority areas (Strategy 1.2).

# 2 WILDLIFE AND ROAD CROSSINGS IN COYOTE VALLEY

Major roads traversing Coyote Valley consist of Highway 101, Monterey Road, Bailey Avenue and Santa Teresa Boulevard. Each of these roadways presents challenges for wildlife attempting to cross as well as opportunities for increasing permeability for wildlife and reducing wildlife-vehicle collisions. While some of the roads described below extend outside of Coyote Valley, the following descriptions pertain specifically to the portion within Coyote Valley.

**Highway 101** is a 10-lane highway that features several locations where wildlife have been documented successfully crossing under the roadway through existing culverts and underpasses. In September and October 2016, Caltrans cleared two blocked culverts that had previously been utilized by wildlife to travel under the highway, after which wildlife use resumed (Diamond and Snyder 2018b). Efforts to improve additional culverts are underway (e.g. Caltrans maintenance activities including fence realignment and habitat restoration work by the Santa Clara Valley Water District) and present ongoing opportunities to improve this roadway for wildlife passage.

**Santa Teresa Boulevard** is a two-lane road that runs north-south and features several culverts in north Coyote Valley. Certain wildlife species have been documented utilizing the culverts to travel under the road, when the culverts are not inundated with water (Diamond and Snyder 2016). An increase in roadkill along this road is expected if there is an increase in traffic and/or development.

**Bailey Avenue** is a four-lane road that runs east-west through Coyote Valley. Two existing culverts (one at Fisher Creek and the other in the immediate vicinity) provide opportunities for certain wildlife to pass safely under the road, when the culvert is not inundated (Diamond and Snyder 2016; CVWPID 2017).


**Monterey Road.** Photo by Pathways for Wildlife.

**Monterey Road** is a four-lane road running through Coyote Valley from approximately Metcalf Road in the north to approximately Tilton Avenue to the south. Much of this eight-mile stretch of the road includes a 32" tall concrete median with a 24" anti-glare fence on top. Together, these present a nearly 5'-high visual and physical barrier to wildlife attempting to cross the road. An existing culvert located at the confluence of Fisher Creek and Coyote Creek provides a suitable undercrossing for certain wildlife species and is the only infrastructure that supports safe-passage.

# WILDLIFE USE OF COYOTE VALLEY: PREVIOUS RESEARCH

A substantial amount of research has been done on wildlife use of Coyote Valley over the past decade. These studies used a number of techniques to document animal movement:

**Roadkill surveys** identify roadkill hotspots – locations where there is a concentration of wildlife mortality on a road. These highlight locations where measures to reduce wildlife-vehicle collisions would be most effective (Huijser *et al.* 2007b).

**Remote, motion-sensor cameras** (i.e. trail camera, field camera, camera traps) inventory species in a given area, document behaviors (O'Brien 2011), and monitor use of infrastructure such as underpasses and bridges, and more (Cramer 2012).

**Radio telemetry** uses radio signals to locate a transmitter attached to an animal (GPS-enabled collar) and provide movement and GPS-based location data. This can track animal movement and location, and also provide behavioral information (Cagnacci *et al.* 2010).

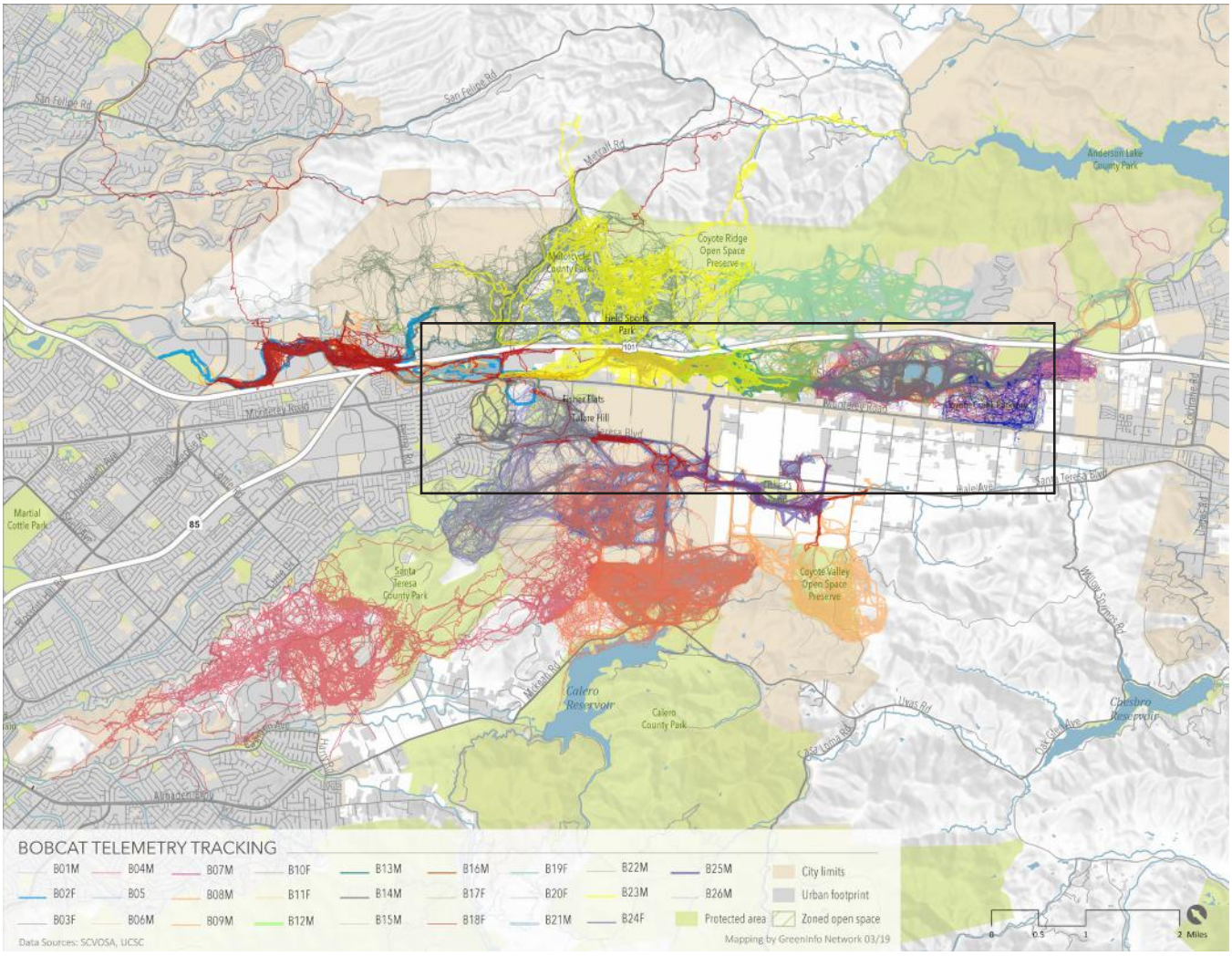
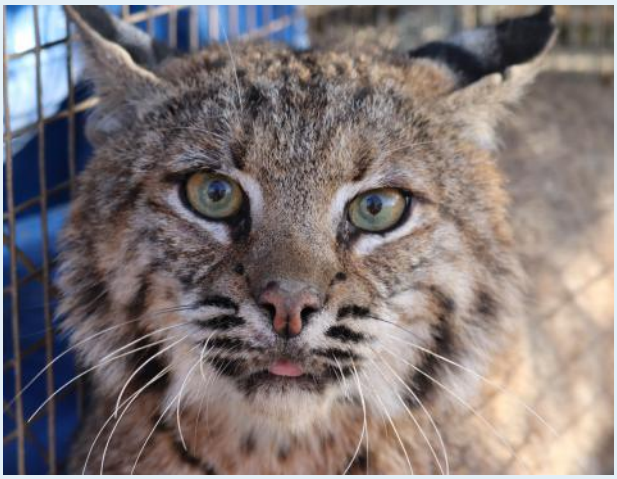



**Figure 2** • Movement of 26 bobcats, as tracked by GPS collars.

## PROFILE: BOBCAT B11F

B11 was collared on November 19, 2017 in Coyote Creek County Park.

B11 was recorded on a field camera crossing under US Highway 101 several times in November 2017, December 2017, and January 2018, using an existing 3'x3' round concrete culvert to access habitat on Coyote Ridge and Coyote Creek Parkway.




On February 17, 2018, B11 attempted to cross Monterey Road in the vicinity of Fisher Creek and Tulare Hill. When the GPS collar transmitted a mortality signal, the research team located the carcass and determined the cause of death to be a wildlife-vehicle collision.

After reviewing the dataset, the team determined that B11 had successfully crossed Monterey Road four times before being killed.

Photos by Pathways for Wildlife.

**The recommendations in this report are particularly informed by data from three studies:**

**Safe Passage for Coyote Valley 2007 - 2012** (Phillips *et al.* 2012)

- Inventoried species and use of habitat in Coyote Valley. Methods included bird surveys, camera studies, field tracking methods, and vegetation sampling.
- Funded and completed by the De Anza College Wildlife Corridor Technician Program.

**Coyote Valley Linkage Assessment Study 2014 - 2016** (Diamond and Snyder 2016)

- Identified wildlife movement pathways in Coyote Valley, species use (including breeding females and offspring), and movement barriers (including evidence of influence on genetic diversity of ground squirrels).
- Methods included camera studies, roadkill surveys, and collection of California ground squirrel scat. Completed by Pathways for Wildlife with genetic work completed by the University of California, Berkeley. Funded by California Department of Fish and Wildlife, the Santa Clara Valley Open Space Authority, and the Guadalupe-Coyote Resource Conservation District.

**Coyote Valley Bobcat and Gray Fox Connectivity Study (2017 - 2019)** (Serieys *et al.* in preparation 2019, Diamond and Snyder 2018a)

- Study will identify location and frequency of road crossings, movement corridors, and preferred habitat. Final report available summer 2019; initial findings from the study have been provided by the lead scientist and are included in this report.
- Methods include the use of GPS-enabled collars to track bobcats, camera monitoring, and roadkill surveys.
- Led by the Wilmers Lab at the University of California, Santa Cruz with Pathways for Wildlife. Funded by POST, the Gordon and Betty Moore Foundation, California Department of Fish and Wildlife, Santa Clara Valley Open Space Authority, and Santa Clara Valley Habitat Agency.

## ROADKILL DATA

Scientists collected roadkill data in Coyote Valley for a number of years (2006-2010 and 2014-2018). These data provide important inputs to the report recommendations, as wildlife species and size are both important considerations when designing mitigations to reduce wildlife-vehicle collisions (Clevenger and Huijser 2011). Wildlife size is also relevant when assessing the risk to drivers and associated cost to society (Huijser *et al.* 2008).

### ROADKILL – SPECIES INVENTORY

**Large**

Mule deer (*Odocoileus hemionus*)

Puma (*Puma concolor*)

Wild pig (*Sus scrofa*)

**Medium**

American badger (*Taxidea taxus*)

Bobcat (*Lynx rufus*)

Coyote (*Canis latrans*)

Gray fox (*Urocyon cinereoargenteus*)

Northern raccoon (*Procyon lotor*)

**Small**

Black-tailed jackrabbit (*Lepus californicus californicus*)

California ground squirrel (*Otospermophilus beecheyi*)

Striped skunk (*Mephitis mephitis*)

Virginia opossum (*Didelphis virginiana*)

Western pond turtle *(Actinemys marmorata)*

Includes all available roadkill data

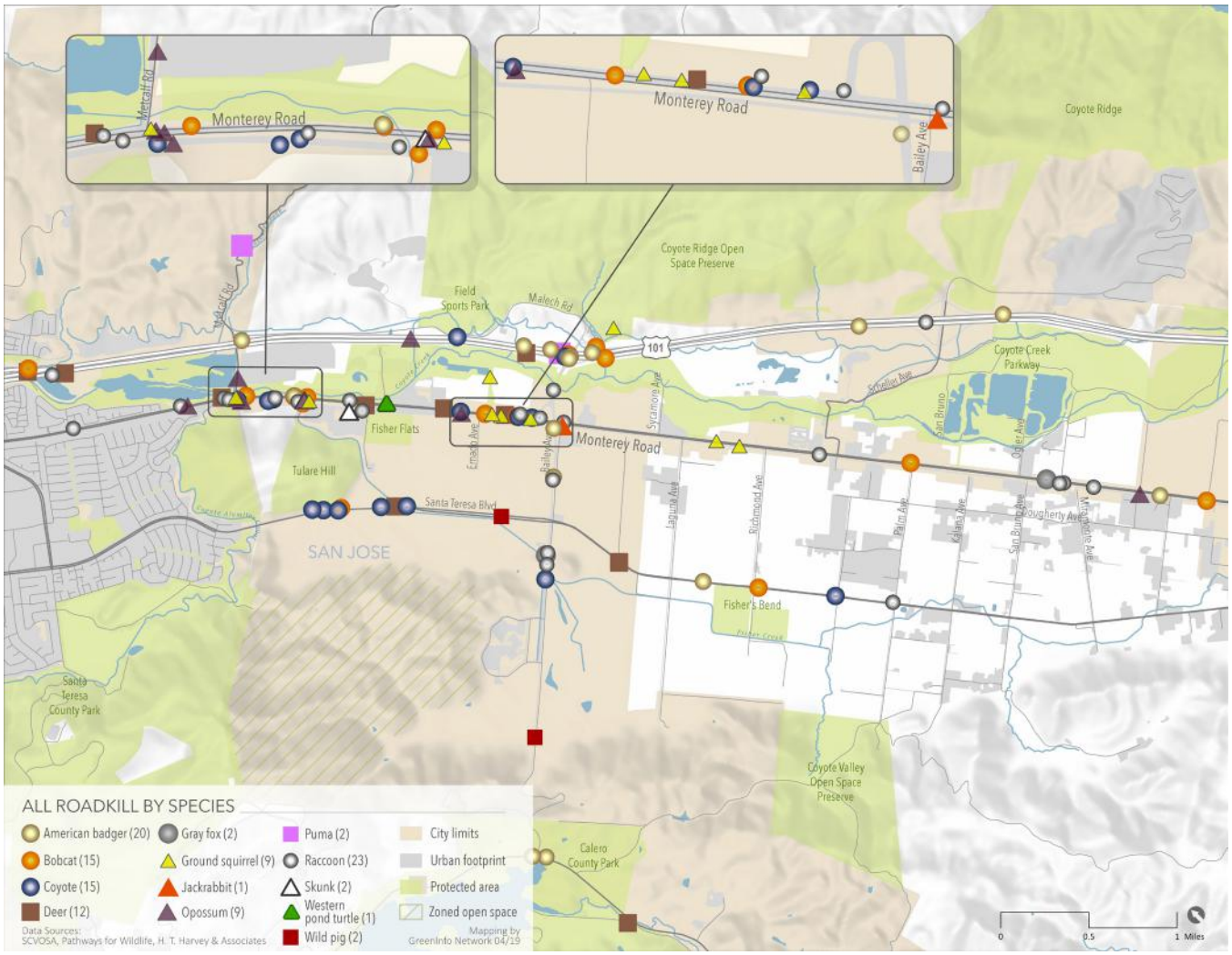



**Figure 3** • Roadkill documented in Coyote Valley, by species. Includes all available roadkill data.

**Western pond turtle kill on Monterey Road.** Photo by H.T. Harvey & Associates.


**American badger.** Photo by Bob Gunderson.

# 3 ANALYSIS: MONTEREY ROAD HOTSPOTS

While the previous section of this report includes all available reliable data (whether collected opportunistically or during routine surveys), this section of the report includes only roadkill data collected by Pathways for Wildlife during routine survey efforts (Diamond and Snyder 2018a).

During 2015-2016 and 2017-2018, routine and extensive roadkill surveys were conducted every week. For 2015-2016, weekly surveys were conducted from Jan 2015-Jan 2016. For 2017-2018, weekly surveys were conducted from May 201-Sept 2018.

The roads that were surveyed during 2015-2016 and 2017-2018 for the wildlife-vehicle collision data included Highway 101, Monterey Road, Santa Teresa Road, Bailey Road, Laguna Road, Richmond Road, and Palm Ave.

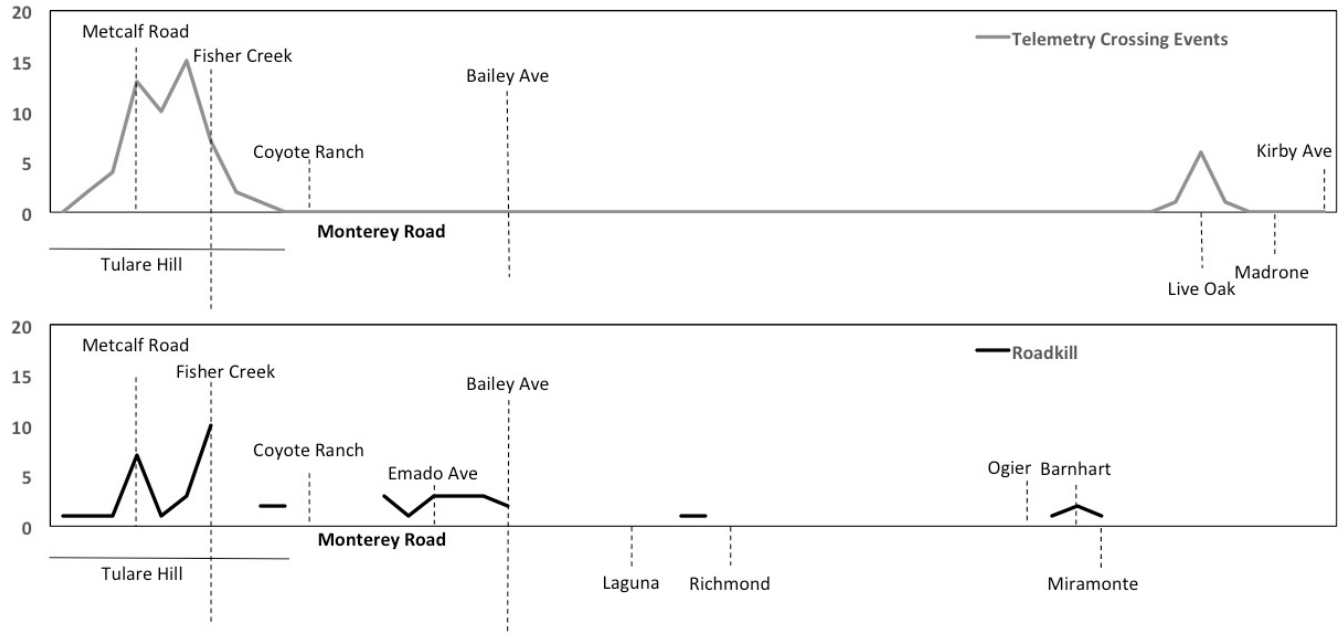



**Figure 4** • Telemetry crossing events and roadkill on Monterey Road. These graphs depict the bobcat telemetry crossing events (9 animals, 62 crossing events) and roadkill (53 animals) on Monterey Road.

Moving north to south, 1/8 mile indexed boxes were established along Monterey Road (x-axis), and the number of crossing events or roadkill summed (y-axis). East-west roads and Fisher Creek are indicated on the x-asis at the appropriate interval. Most of these end at their intersection with Monterey Road either from the east or west. This is indicated by a dotted line intersecting the axis – roads radiating eastward are above the x-axis, those radiating westward are below the x-axis. Fisher Creek and Bailey Avenue cross Monterey Road and their dotted lines extent beyond the x-axis. The relative position of Tulare Hill along Monterey Road is also displayed.

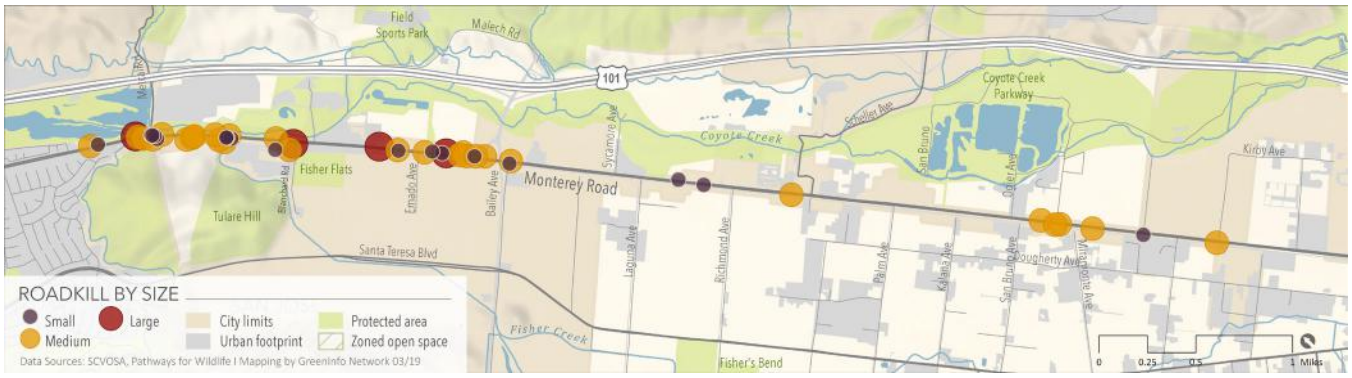



**Figure 5** • Roadkill by size, along Monterey Road.


**Figure 6** • Roadkill counts on Monterey Road, highlighting hotspots north of Bailey Avenue.

In the periods during which routine surveys were not conducted, data were also collected opportunistically during the years 2013-2014 and 2016-2017. Data collected during these years followed the same survey and collection protocols. For 2016-2017, surveys were conducted twice a month from February 2016-April 2017. During the years 2006-2010 and 2013-2014, data were collected approximately once per month, but did not involve routine survey efforts along each road within the study area (Diamond, T. personal comm. 2018).

Surveys along Highway 101, Monterey Road, Santa Teresa Boulevard, and Bailey Avenue show that 63% of all roadkill in the study area was on Monterey Road (Figure 7) (Diamond and Snyder 2018a). Of the documented roadkill on Monterey Road, 78% was within the section that runs between Metcalf Road and Bailey Avenue. The concentration of roadkill suggests that Monterey Road presents a more substantial barrier to wildlife movement than Highway 101, Santa Teresa Boulevard, or Bailey Avenue, and that the Monterey Road corridor is likely the main existing barrier to wildlife movement in the Coyote Valley.

Although documented outside of the routine survey periods, it is worth noting that western pond turtle and American badger, both listed as Species of Special Concern by the California Department of Fish and Wildlife, were documented as roadkill on Monterey Road between Bailey Avenue and Metcalf Road in 2015 and 2008, respectively (H.T. Harvey & Associates 2019; Diamond & Snyder 2018a). An American badger roadkill was also documented in 2008 in the westbound lane of Bailey Avenue at the intersection with Monterey Road and in 2009 on the southbound lane of Monterey Road, north of Live Oak Avenue (H.T. Harvey & Associates 2019).

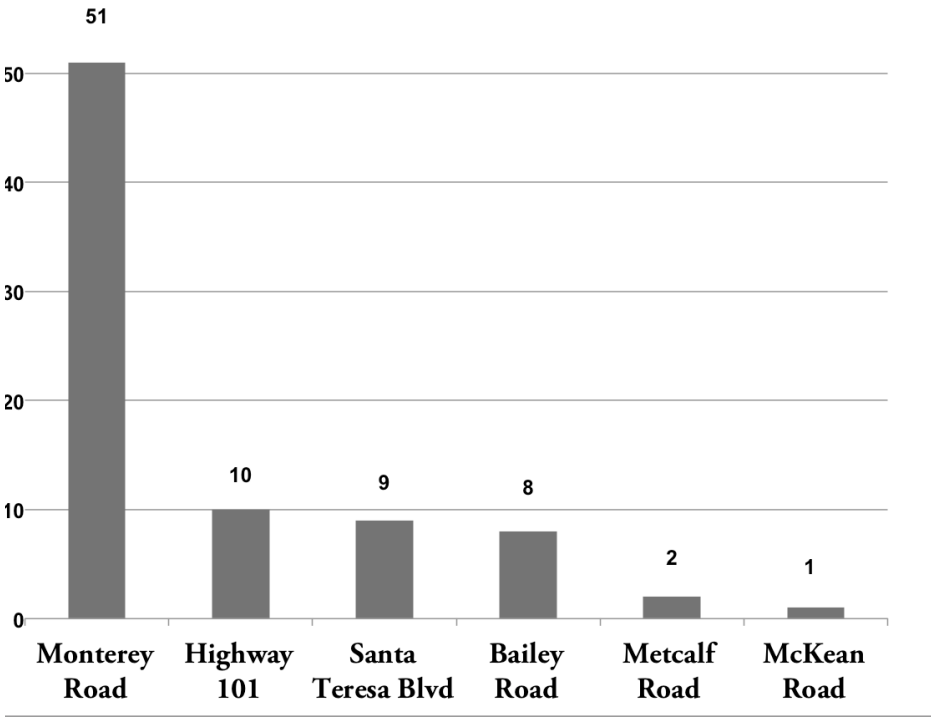



**Figure 7** • Number of roadkill on major roads in the study area. Of 81 total, 51 were on Monterey Road.

The concentration of roadkill on Monterey Road is likely exacerbated by the physical characteristics of the road. The majority of the 8-mile stretch of Monterey Road features a 32"-high cement median barrier, with extensive sections that include an additional 2'-anti-glare fence, together measuring approximately 5' in height).

**Median barrier on Monterey Road.** Photo by Stephi Matsushima.

There is only one culvert under Monterey Road, at the confluence of Fisher Creek and Coyote Creek. Studies that documented use of the Fisher Creek culvert (under Monterey Road) by a subset of wildlife also documented roadkill in the immediate vicinity of the culvert. Despite its size, the culvert does not accommodate use by a wide variety of wildlife species, due to a lack of natural substrate and the presence of rip-rap and ponding water on the east side. In comparison, the stretch of Highway 101 that runs through Coyote Valley features numerous culverts and underpasses of various sizes and configurations. Studies have shown that wildlife use many of these culverts and underpasses to travel under Highway 101 (Diamond and Snyder 2016; Diamond and Snyder 2018a; Phillips *et al.* 2012).

**Fisher Creek culvert under Monterey Road.** Photo by Pathways for Wildlife.

**Western pond turtle.** Photo by Cait Hutnik.

Bobcat telemetry (GPS collar) data indicate concentrated activity in the north Coyote Valley and provide additional insight into wildlife interactions with Monterey Road (Figure 8). A study of 26 bobcats (Serieys *et al.* in preparation) showed that eight of the nine individuals that crossed Monterey Road did so between Metcalf Road and Bailey Avenue. Of these nine, two were killed by vehicle collisions near Fisher Creek and Tulare Hill (Serieys *et al.* in preparation). A third was killed in south Coyote Valley.


**Figure 8** • Bobcat crossings of Monterey Road, as measured by GPS collars and roadkill.

Telemetry data for all 26 bobcats indicate that the median barrier on Monterey Road impacted their movement. For example, during the study period, B03F, a female bobcat with kittens, made more than 3,000 road crossings of Bailey Avenue and McKean Road, neither of which feature a median barrier. Though there were numerous GPS-collared individuals inhabiting areas adjacent to Monterey Road, there were fewer than 60 attempted road crossings.

These data also illustrate which areas of Coyote Valley are most heavily used by bobcats. While access to conduct trapping activities on private property was limited (particularly in the mid-valley), bobcat activity appears to mostly occur in areas with the most intact habitat, particularly that which provides vegetative cover (Serieys *et al.* in preparation).

Genetic data from ground squirrel populations in Coyote Valley indicate that roads present significant barriers to their movement, and other wildlife are likely to be similarly impacted. This is supported by research showing genetic differentiation among wildlife populations on either side of US Highway 101 in the Santa Monica Mountains (Riley *et al.* 2006) and the vicinity in southern California (Delaney *et al.* 2010).

These studies, together with roadkill and other local data, suggest that Monterey Road is the most serious barrier to wildlife movement in Coyote Valley, as it inhibits habitat access and is the main location of wildlife-vehicle collisions. Unless the permeability of the road is increased for wildlife movement, it may impact long-term population viability (e.g. by impeding gene flow), community composition (e.g. changes resulting from local extinction), and ecosystem function (e.g. processes facilitated by interrelationships between organisms).

**Mule Deer**. Photo cc by Andy Weeks.

# 4 RECOMMENDATIONS TO REDUCE WILDLIFE-VEHICLE COLLISIONS

## KEY FACTORS FOR RECOMMENDATIONS

The following factors were used identify how and where wildlife crossing infrastructure would be most effective:

**Habitat quality** is the relative intactness of wildlife habitat on either side of Monterey Road, as well as larger landscape connectivity – the ability of wildlife to navigate to larger, higher-quality habitat crossing Coyote Valley into the Santa Cruz Mountains or Diablo Range.

**Habitat protection** refers to lands managed for ecological protection or as open space. Natural resources are protected by ownership or conservation easement held by a federal, state, or local open space agency, or non-governmental organization, or by enrollment in a mitigation bank. Protected lands in Coyote Valley include Coyote Creek Parkway, Tulare Hill, Coyote Valley Open Space Preserve, Coyote Ridge Open Space Preserve, Coyote Ridge Preserve, Consolidated Biological Mitigation Project, Coyote Ridge Conservation Area, Fisher's Bend, and Fisher Flats.

**Roadkill hotspots** are locations with documented concentrations of wildlife-vehicle collisions or wildlife mortality. Locations are identified by the presence of roadkill. These also provide information on species occurrence, which is relevant when designing wildlife crossing infrastructure

**Successful crossings** are locations where wildlife crosses a road without being killed. In this case, these are documented via bobcat telemetry data and/or appropriately-positioned motion-sensor cameras.


**Wildlife crossing sign unveiling event, November 30, 2018.** Left to right: Andrea Mackenzie, Santa Clara Valley Open Space Authority; State Assemblymember Marc Levine; State Senator Bill Monning; State Assemblymember Ash Kalra; San Jose City Councilmember Sergio Jimenez; State Assemblymember Mark Stone; Megan Medeiros, Committee for Green Foothills; Laura Wells, San José Department of Transportation.

## WILDLIFE CROSSING INFRASTRUCTURE

The conservation value of wildlife crossing infrastructure is recognized as an effective measure to help species species persist in today's landscape and also to adapt to climate change (Clevenger and Huijser 2011).

A **wildlife overcrossing** (left) is similar to a bridge or overpass and is designed to provide a seamless habitat connection over roads and railways. Effective overcrossings are vegetated and constructed to certain specifications regarding slopes and grades. They include directional fencing and design features to minimize noise from vehicular traffic.

A **wildlife undercrossing** (below) is a culvert or tunnel that allows wildlife to pass safely under surface transportation infrastructure. Existing infrastructure (e.g., culverts) may be retrofitted to include characteristics that will encourage use by wildlife (e.g., increased width, native substrate). Regardless of whether the wildlife undercrossing is a modification of an existing structure or creation of a new structure, the most effective undercrossings are large, allow for good visibility through the structure, include a mix of openness and vegetative cover, incorporate directional fencing, and minimize exposure to noise (Cramer 2012). Although not designed for the needs of wildlife, the Fisher Creek crossing at Monterey Road (and the Union Pacific Railroad) is considered an undercrossing feature.

**Directional fencing** is an important component of most effective wildlife crossing infrastructure, as it inhibits wildlife from accessing the road or railway and directs them to opportunities for safe passage. Fencing design should consider the species of interest, which informs height, extent, and materials (such as features to inhibit small wildlife from passing through or under the fencing).

# RECOMMENDATIONS

The recommended wildlife crossing infrastructure are based on proven, effective measures to reduce wildlife-vehicle collisions (Clevenger and Huijser 2011). Conceptual design criteria for this wildlife crossing infrastructure were developed with the guidance of Anthony P. Clevenger, PhD, a world-renowned expert in the field of road ecology and wildlife crossing infrastructure. Recommendations are grouped into (1) interim actions and (2) major wildlife crossing infrastructure investments.

# INTERIM ACTIONS

Interim actions are recommended for implementation within the next five years along Monterey Road in Coyote Valley. They are lower-cost improvements to be implemented in advance of the major wildlife crossing infrastructure investments. Traffic volume remains high on this stretch of roadway and should be expected to continue to pose a threat to at-grade crossings by wildlife. While implementation of these measures may reduce wildlife-vehicle collisions, they should not be seen as safe-crossing alternatives.

- **Install roadway signs** to educate drivers and the general public about wildlife crossings.
    - Signs can influence driver behavior by raising awareness about wildlife activity and road crossings.
    - The City of San José installed two signs in November 2018 – one at the northern end of Monterey Road (at Metcalf Avenue) and one at the southern limit of where Monterey Road traverses Coyote Valley (at Tilton Avenue).
    - Installation of an additional sign for northbound traffic entering Monterey Road from Bailey Avenue is recommended.
- **Reduce speed limit.**
    - Lower speeds provide drivers with additional time and distance to react to wildlife crossings.
- **Modify the median barrier** in strategic locations identified in Figure 9.
    - Remove anti-glare fencing the entire length of the road.
    - Increase the length of the gaps in the median barrier at the Monterey Road intersections with Metcalf Road, Blanchard Avenue, and Bailey Avenue in order to reduce wildlife entrapment and collisions with vehicles by increasing the openness of the road.
    - Replace some or all of the median with a more wildlife-friendly design such as a "w-beam" guard rail.
    - In addition to further refinement based on vehicular safety and wildlife use criteria, any modifications to the median barrier should assess potential impacts on flood risk.
- **Implement interim modification of the Fisher Creek culvert** as it passes under Monterey Road and Union Pacific Railroad.
    - Restore habitat adjacent to the existing culvert to encourage wildlife use.
    - Improve conditions at the downstream side/outlet of the culvert, such as modification of rip rap and/or Sakrete retaining wall.
- **Develop and implement a monitoring program** to evaluate effectiveness of minor wildlife crossing improvements and inform adaptive management. Monitoring the effect of the signage may not be necessary.

# MAJOR WILDLIFE CROSSING INFRASTRUCTURE INVESTMENTS

Implementation of major wildlife crossing infrastructure investments are recommended for implementation in the next five to ten years, and will require additional planning and substantial funding commitments. Major wildlife crossing infrastructure investments consist of proven enhancements that allow for safe passage over or under Monterey Road, Union Pacific Railway, and future infrastructure (e.g., High-Speed Rail) in Coyote Valley. They were designed to accommodate use by mountain lion and deer (target species), as well as bobcat, coyote, fox, and badger. Wildlife crossings designed to accommodate these wildlife allow for use by a diverse array of guilds and species.

A preliminary design and engineering evaluation determined that wildlife crossing structures with the proposed dimensions are feasible. A detailed engineering process will be necessary to refine the dimensions and design details, depending on the length of each structure and other site characteristics.

In addition to sizing, elements that influence the overall effectiveness of the structure include visibility, substrate, cover, and directional fencing. Given the complexity of site conditions along Monterey Road, additional planning will be needed in order to determine the inclusion and design of any directional fencing.

The first three recommendations have been further developed from previously-recognized priority sites (Santa Clara Valley Open Space Authority and Conservation Biology Institute 2017) and have also been included in all potential alternatives for High-Speed Rail.

- **Install a wildlife undercrossing under Monterey Road, connecting Tulare Hill and Coyote Creek.**
    - A preliminary design and engineering evaluation identifies an undercrossing of approximately 15’ (H) x 100’-150’ (W) as feasible at this location.
    - This action would facilitate wildlife passage under Monterey Road at a documented hotspot.
- **Retrofit/redesign of the Fisher Creek culvert** to enhance the connection between Fisher Creek and Coyote Creek.
    - A preliminary design and engineering evaluation identifies an undercrossing of approximately 15’ (H) x 40’ (W) as feasible at this location.
    - This action would facilitate wildlife passage under Monterey Road at a documented hotspot.
- **Install a wildlife undercrossing under Monterey Road south of Emado Avenue**, connecting lands on the west side and Coyote Creek Parkway.
    - A preliminary design and engineering evaluation identifies an undercrossing of approximately 15’ H x 40’ W as feasible at this location.
    - A wildlife crossing at this location would complement proposed infrastructure at Tulare Hill and Fisher Creek.
- **Install a wildlife overcrossing across Monterey Road immediately north of Bailey Avenue.**
    - A width of approximately 150’ is recommended for an overcrossing, based on a precedent of comparable scale that was constructed in Arizona (Coalition for Sonoran Desert Protection 2018).
    - A wildlife crossing at this location would complement proposed infrastructure in other locations. As the only proposed overcrossing, this would be expected to accommodate use by species or individuals that are averse to using undercrossings or riparian areas (Eco-Kare International 2017).

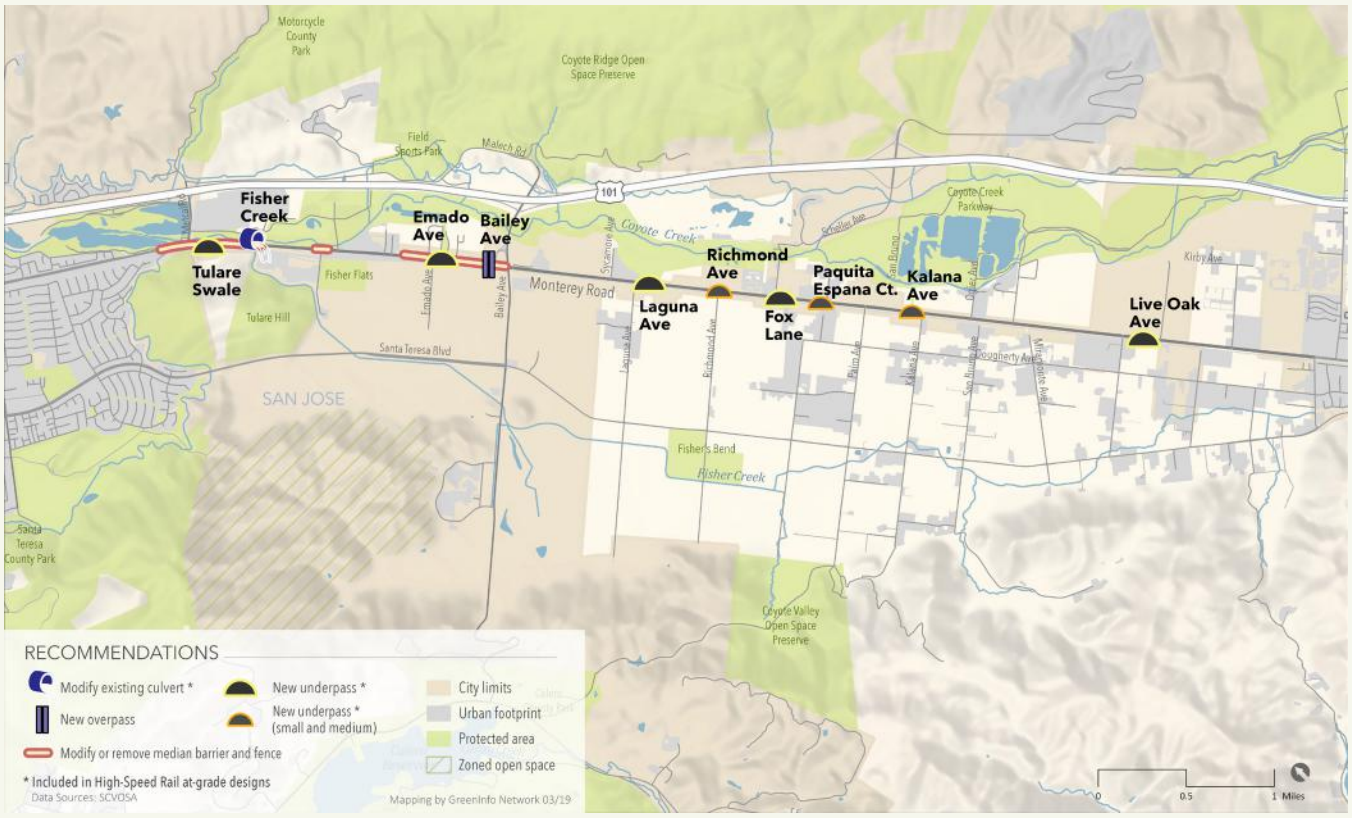



**Figure 9** • Recommended interim and major wildlife crossing infrastructure improvements for Monterey Road.

| Location | Structure type | Recommended dimensions* | | | Minimum dimensions* | | | Design notes* | Est. cost** |
|---|---|---|---|---|---|---|---|---|---|
| | | H | W | L | H | W | L | | |
| **Tulare Hill** | Underpass | 15' | 150' | TBD | 15' | 100' | TBD | Requires adequate light penetration. Multispecies riparian habitat crossing. Focal species mountain lion, but designed to accommodate deer, bobcat, coyote, fox, badger, and western pond turtle. | TBD |
| **Fisher Creek** | Underpass | 15' | 40' | TBD | 15' | 30' | TBD | Requires adequate light penetration. Multispecies riparian habitat crossing. Focal species mountain lion, but designed to accommodate deer, bobcat, coyote, fox, badger, and western pond turtle. | $1.3M-$1.5M |
| **South of Emado Avenue** | Underpass | 15' | 150' | TBD | 15' | 40' | TBD | Requires adequate light penetration. Multispecies crossing. Focal species mountain lion, but designed to accommodate deer, bobcat, coyote, fox, and badger. | $1.3M-$2M |
| **North of Bailey Avenue** | Overpass | N/A | 150' | TBD | N/A | 150' | TBD | Multispecies upland habitat crossing. Focal species mountain lion, but designed to accommodate deer, bobcat, coyote, fox, and badger. | $10M-$25M |
| **South of Laguna Avenue** | Underpass | 15' | 150' | TBD | 15' | 40' | TBD | Requires adequate light penetration. Multispecies crossing. Focal species mountain lion, but designed to accommodate deer, bobcat, coyote, fox, and badger. | $1.3M-$1.5M |

**Figure 10** • Major wildlife crossing infrastructure improvements recommended for Monterey Road in Coyote Valley.

* Assumes crossing designs integrate preferred crossing attributes (e.g. substrate, cover), including species-specific design considerations, to be developed at a later stage; undercrossing dimensions to be refined based on length of structure.

** Cost estimates were developed in 2016 by Sherwood Design Engineers, and are intended only for use in preliminary planning.

- **Install wildlife undercrossing under Monterey Road south of Laguna Avenue connecting existing open space habitat and Coyote Creek Parkway.**
    - This would further increase the permeability of the roadway for wildlife and provide opportunities for safe wildlife passage, especially due to the presence of large undercrossing features further south under Highway 101 (e.g. Golf course underpass, Coyote Creek Parkway).
- **Develop and implement a monitoring program** to evaluate effectiveness of wildlife crossing infrastructure (including any directional fencing) and inform adaptive management.

Implementation of certain recommendations will influence and potentially limit the appropriateness and effectiveness of others (e.g. potential incompatibility between median modification and installation of directional fencing). Project level planning should be undertaken with the appropriate agencies, experts, and stakeholders as any of the recommendations are implemented.

# RELATED PLANNING EFFORTS

The California High-Speed Rail Authority is evaluating several alternatives for a **High-Speed Rail** alignment through Coyote Valley, although the timeline and process for the project are highly uncertain. All alternatives that have been identified to date would run within or along Monterey Road. Given the study results and recommendations provided in this report, additional impacts to the Coyote Valley landscape linkage could sever existing connections and negate the proposed recommendations or include major wildlife crossing infrastructure in the design. If project planning and construction proceed, exceptional care and attention must be taken to mitigate impacts and contribute to improved wildlife movement across the Monterey Road transportation corridor. Ongoing monitoring and adaptive management will be extremely important.

The Bay Area Ridge Trail Council began a feasibility study for a **Bay Area Ridge Trail connection through Coyote Valley** in November 2018. The primary objective is to identify a trail connection from the existing 1.8-mile section of the Bay Area Ridge Trail in Santa Teresa County Park to the Coyote Creek Trail, as well as a connection across US 101 to the Coyote Ridge Open Space on the east side. The secondary objective is to find and configure a trail alignment that will also benefit wildlife crossings of the intervening barriers – Santa Teresa Boulevard, Monterey Road and adjacent railroad line, and US 101. Like the High-Speed Rail alternatives, this effort should be informed by this report and make careful considerations so that public/human use will avoid impacts to wildlife behavior.

The Santa Clara Valley Open Space Authority and POST will initiate a **Coyote Valley Reptile and Amphibian Linkage Study** in Spring 2019. This study will characterize existing habitat suitability, identify impassable barriers or impediments to movement, and analyze the potential for broader habitat connectivity, listed species conservation, and recovery. The project is in support of the goals of the Santa Clara Valley Habitat Plan – a joint Habitat Conservation Plan and Natural Community Conservation Plan. The study findings may provide additional insight and detailed considerations for the implementation of recommendations described in this report. Additionally, it will serve as a tool for the Santa Clara Valley Habitat Agency, planners, land conservation organizations, transportation agencies, the City of San José, and resource agencies, to consider the focal species and connectivity for these species' populations during decisions on land use, transportation, and conservation in Coyote Valley.

**Coyote.** Photo by Bob Gunderson.

# 5 NEXT STEPS: POTENTIAL FUNDING AND PARTNERSHIPS

The citizens of San José and across California have demonstrated support for landscape conservation and protection of wildlife. Most recently, Proposition 68 on the June 2018 ballot was passed by voters and includes tens of millions of dollars identified to support wildlife linkages. In 2014, Santa Clara County passed Measure Q, which provided the Santa Clara Valley Open Space Authority funding to protect open space lands.

Conservation organizations, including the Santa Clara Valley Open Space Authority and POST, have recently committed to a campaign of conservation land acquisition in the Coyote Valley with up to $80 million in funding. This conservation campaign is well-aligned with the long-term recommendations of this report and prioritizes land necessary to invest in wildlife crossing infrastructure at key locations on Monterey Highway.

In addition to this campaign, the City of San José recently included up to $50 million for conservation acquisition of Coyote Valley lands in its Measure T, Public Safety and Infrastructure general obligation bond. The City of San José has convened public agency/NGO stakeholders and willing landowners to discuss the conservation of priority lands in Coyote Valley.

The recommendations provided in this report are intended to support further discussion, planning, and partnership for implementation. Interim enhancements are relatively inexpensive and easy to implement, and should be considered soon, starting with stakeholder meetings to discuss the findings of this report and identify near-term actions.

While the recommended major enhancements represent multi-year, multi-million dollar investments, they are proven mitigations that would effectively reduce wildlife-vehicle collisions and increase landscape connectivity. These long-term solutions should be pursued through targeted land protection (open space conservation), land use and transportation planning, and stakeholder collaboration.

**Raccoon.** Photo by Bob Gunderson.

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# APPENDIX: ADDITIONAL SPATIAL ANALYSIS OF ROADKILL

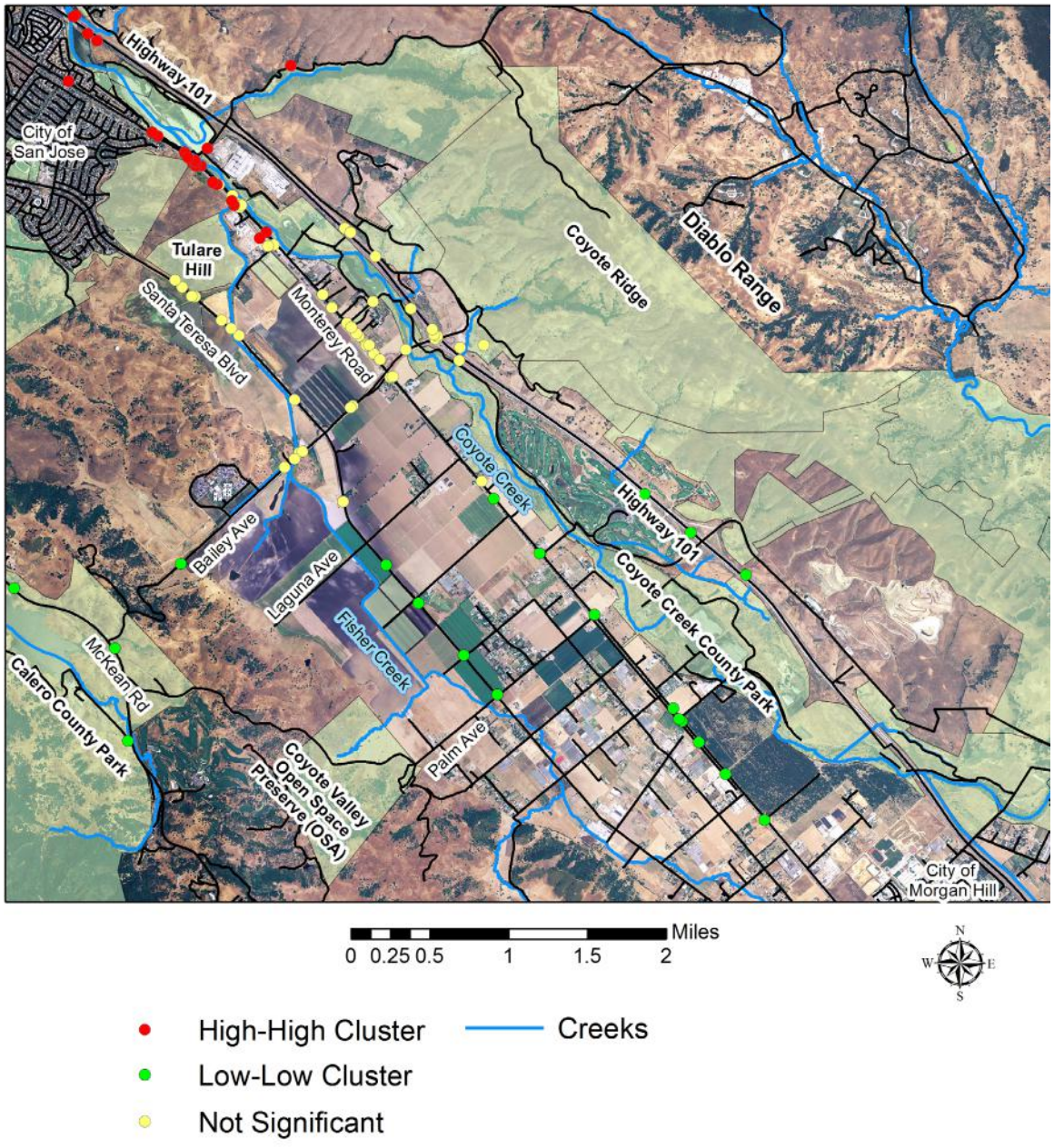


**Figure A1** • Cluster and Outlier analysis with Coyote Valley animal-vehicle collision data from 2006-2010 and 2014-2018. Map and data by Pathways for Wildlife.

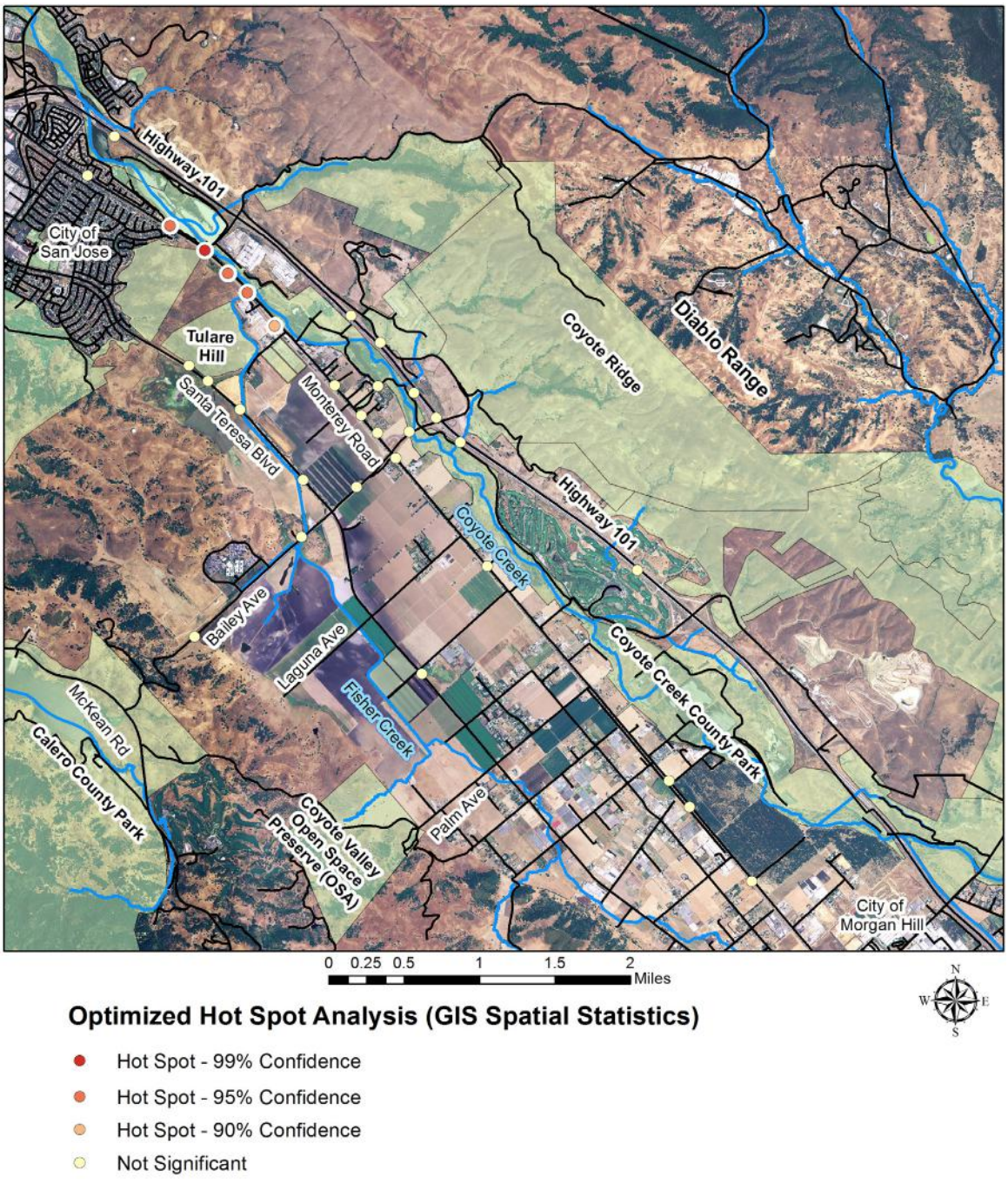


**Figure A2** • Optimized hotspot analysis with Coyote Valley animal-vehicle collision data from 2015-2018. Map and data by Pathways for Wildlife.


Monterey Road, San Jose, CA.

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