

# **SANTA CLARA VALLEY HABITAT PLAN**

## **FOCAL AREA WILDLIFE CONNECTIVITY REPORT**



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**Santa Clara Valley Habitat Plan  
Wildlife Connectivity Report**

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## Executive Summary

### Introduction

Landscape connectivity is crucial to maintaining the long-term viability of native species which rely on habitat permeability to facilitate their daily movement, dispersal, seasonal migration, and long-term adaptation to climate change (Hilty et al. 2019). Preserving habitat linkages is fundamental to conserving biodiversity and protecting populations of wide-ranging species, including mountain lion (*Puma concolor*), in the Central Coast Range Mountains (Gustafson et al. 2019). In this ecoregion, which is a part of a global biodiversity hotspot (Myers et al. 2000), habitat fragmentation due to habitat conversion and transportation within the Southern Santa Clara and Upper Pajaro valleys threatens to sever regionally significant linkages between the Santa Cruz Mountains, Diablo Range, and Gabilan Range mountains (Penrod et al. 2013; Section 2.1.5).

Recognizing the importance of habitat connectivity, the Santa Clara Valley Habitat Plan (Habitat Plan) landscape goals address the need to maintain connections within and outside the Plan Area: a 519,506-acre area centered on the southern Santa Clara Valley and adjacent portions of the Santa Cruz Mountains and Diablo Range (ICF 2012; Appendix A). While the valley predominantly features agriculture and urban development with some protected open space, the adjacent mountain ranges support large areas of intact, natural communities including serpentine grasslands, riparian forest and scrub, and oak woodlands. These communities support diverse assemblages of native species including nine plants and nine animals covered by the Habitat Plan (Section 1.1) as well as other wide-ranging terrestrial species such as American badger (*Taxidea taxus*) and mountain lion (ICF 2012).

The Habitat Plan conservation strategy identifies 20 potential linkages, defined as areas that allow for the movement of species from one area of suitable habitat to another (ICF 2012), that may facilitate connections within and outside the Plan Area (ICF 2012; Appendix A). The Habitat Plan focuses on the linkages in three areas: 1) Coyote Valley; 2) the Upper Pajaro River; and 3) Pacheco Pass (Figure 1). The topography, land cover, and land uses, among other aspects of the three focal areas, which have been identified as important for connectivity in several statewide and regional plans (Table 4), present opportunities for protecting and improving landscape linkages between the Santa Cruz Mountains, the Diablo Range, and the Gabilan Range. Given their regional and statewide importance, these focal areas have been the subject of recent connectivity analyses and plans over the past decade including the Coyote Valley Linkage Plan (SCVOSA and CBI 2017), Southern Santa Cruz Mountains Wildlife Connectivity Study (Diamond et al. 2022), and the Pacheco Pass Wildlife Connectivity Study (Pathways for Wildlife 2020a; Section 3).

### Project Goal and Approach

The purpose of this report is to 1) synthesize existing information on connectivity in the three Habitat Plan connectivity focal areas; and 2) recommend feasible options to promote connectivity, based on a synthesis of prior plans, studies, and other data. This report is prepared to reflect this analysis and inform future work by the Habitat Agency and its partners to prioritize connectivity projects to safeguard and enhance local and regional linkages. The Habitat Agency will then work to assess the feasibility of specific connectivity improvement projects on a case-by-case basis by addressing in greater detail numerous additional factors including engineering feasibility, safety, costs, and regulatory requirements (Box 3).

To synthesize the most salient information available on connectivity in the Plan Area, recent plans and assessments of connectivity, transportation ecology, and wildlife movement were assembled in a connectivity literature database, which can be used by the Habitat Agency and its partners to develop and implement connectivity projects (Section 3.1). The plans, reports, and corresponding spatial data of linkage designs and connectivity infrastructure (Table 3) were reviewed to identify and summarize the primary findings and recommendations for enhancing connectivity, specifically in the three focal area (Section 4).

Section 2 describes aspects of the focal areas that influence connectivity, including topography, land use patterns, and threats, which are summarized in Table 2. Section 4 combines this analysis of the regional setting with the key findings from connectivity plans, studies, and related analyses synthesized in Section 3. For each focal area, the report identifies the following which are summarized in Table 5: 1) key connectivity studies and plans, that provide a foundation for the recommended work; 2) relevant Habitat Plan conservation strategy elements, including linkage areas and conservation analysis zones (Appendix A); 3) conservation, transportation, and other infrastructure agencies and organizations working on connectivity in the area; 4) land use, including current and future land use and land ownership patterns; 5) transportation corridors, including current infrastructure and planned improvements; and 6) recommendations for habitat protection, restoration and enhancement, transportation infrastructure improvements, and future studies and plans. These recommended actions can be implemented by the Habitat Agency and/or other conservation organizations and transportation agencies working in the region. Additional strategies, such as working to promote wildlife compatible land practices on private land, can also be implemented to promote connectivity, but are beyond the scope of this report.

## Overall Recommendations

Connectivity in the Plan Area can be improved through four types of strategic actions described in this report: 1) habitat protection, to prevent further fragmentation of habitat, and facilitate efforts to restore habitat; 2) habitat restoration and enhancements, to improve the permeability of habitat to movement, and increase its ability to support populations of species that may require generations to move through the linkages; 3) transportation infrastructure enhancements, to enable wildlife to move through highways, roads, and rail lines; and 4) future studies to fill gaps in understanding of the habitat connectivity needs, and plans to inform the design and implementation of these strategies.

Connectivity strategies should be implemented collaboratively by conservation and transportation agencies and organizations working in the locality to maximize their long-term effectiveness. Table 5 lists potential partners working in the region and summarizes the opportunities, constraints, and recommended strategies for improving connectivity in the Plan Area and each focal area.

4 describes the specific connectivity strategies identified for each focal area, based on the information assembled in Section 3 and the background information in Section 2, which is summarized in the sections below.

### Coyote Valley

Coyote Valley is a narrow section of the Santa Clara Valley, south of the City of San José, flanked by the Santa Cruz Mountains in the west and the Diablo Range in the east (Figure 1). While the foothills feature predominantly intact habitat, located on lands used primarily for livestock grazing, the valley floor

features primarily agricultural lands, including hayfields, row crops, and orchards, with scattered urban development that becomes more concentrated in the south in the City of Morgan Hill (Section 2.2.1). Connectivity across Coyote Valley is primarily impacted by Highway 101 and Monterey Road, which constitute barriers to movement across the valley (Wildlife Corridor Technical Working Group 2019). Habitat connectivity would be further imperiled by High-Speed Rail, which is planned to be built at grade and fenced along in the Union Pacific rail right-of-way, as well as land use intensification.

Several connectivity research, planning, and collaborative conservation projects conducted over the past decade have laid the foundation for ongoing efforts to safeguard and enhance connectivity through Coyote Valley (e.g., SCVOSA and CBI 2017; see Table 5 for complete list). These prior studies and plans have identified a suite of coordinated habitat protection, restoration, and transportation infrastructure improvements that are generally designed to facilitate connectivity through the valley floor and critical transportation infrastructure, to connect important habitat within the adjacent ranges (Section 4.1, Table 5, Figure 2).

**Habitat Protection:** Efforts to connect existing protected lands in the foothills through the northern valley floor, where properties are larger and land use is less intense, should be continued to facilitate safe crossing through the valley including critical transportation corridors. Specific habitat protection priorities include (Section 4.1.1): 1) the Fisher Creek riparian corridor, a known wildlife movement corridor in the valley (Diamond and Snyder 2016), and adjacent Laguna Seca, which can provide opportunities for aquatic species (HT Harvey 2020); 2) habitat in the eastern foothills, which can serve to buffer and expand existing protected lands; 3) habitat adjacent to existing or potential transportation crossing infrastructure to facilitate future enhancements through Highway 101 and Monterey Road including Bailey Avenue and Santa Teresa Boulevard; and 4) habitat between Santa Teresa and Calero county parks, which supports diverse assemblages of native species including pond breeding amphibians (Table 6, Figure 2).

**Habitat Restoration and Enhancement:** Restoration within Coyote Valley can expand and connect habitat for diverse assemblages of native species (Table 5; Section 4.1.2). Specific priorities include: 1) restoring the historic extent of Fisher Creek on the low-lying west side of the valley to support the expansion of wetland habitat and the riparian corridor; 2) restoring Laguna Seca to enhance habitat for aquatic and wetland species; 3) creating and enhancing pond habitat to support pond-breeding species (HT Harvey 2020); 4) improving upland habitat, including grassland and oak woodlands, in mid- and north Coyote Valley; and 5) restoring habitat adjacent to existing and new transportation infrastructure improvements (e.g., Bailey Avenue, Santa Teresa Blvd).

**Transportation Infrastructure Improvements:** Transportation infrastructure improvements recommended for Coyote Valley focus on ameliorating the existing barrier effects of the Highway 101 and Monterey Road corridors, as well as major arterials of Santa Teresa Blvd and Bailey Ave, and protecting and creating crossing opportunities across the roadways and with consideration of the planned High-Speed Rail alignment (Section 4.1.1 ). Existing culverts support some wildlife passage beneath Highway 101 and use of these structures may be improved through retrofitting or replacing the culverts, removing debris, and installing fencing to direct animals to entrances (Table 7). Along Monterey Road, the Fisher Creek culvert is the only undercrossing and near-term improvements such as filling in riprap to allow deer to access the culvert should be prioritized, along with eventual retrofitting or replacement of the structure, potentially in collaboration with High-Speed Rail. Design

of a new wildlife overcrossing should be considered north of Bailey Avenue, in partnership with local partners and High-Speed Rail (Table 7).

**Future Studies and Plans:** Though extensively evaluated, the focal area could be further studied to (Section 0): 1) evaluate herpetofauna in Fisher Creek, Coyote Creek, and Laguna Seca and associated drainages; 2) assess the feasibility of converting existing cropland to grazing lands to enhance permeability; 3) monitor wildlife movement through riparian areas during high-flow periods; and 4) conduct pre-and post-implementation monitoring of connectivity enhancement projects to evaluate their effectiveness.

## Pajaro River

The Upper Pajaro River Valley can provide connectivity between the southern Santa Cruz Mountains, the Diablo Range, and the Gabilan Range to the southwest (Figure 1). In the valley, urban development is concentrated around the City of Gilroy, with cultivated farmland in the south and rangelands in the adjacent foothills which feature extensive grasslands and oak woodland habitat (Section 2.2.2 ). Existing highways impede movement between the adjacent mountain ranges, including Highway 101 which runs along the foothills of the Santa Cruz Mountains, and SR 25, which cuts across the valley from east to west, and SR 152 which crosses the northern valley at the foothills of the Diablo Range (Figure 3). Planned highway projects that would widen Highway 101 and SR 25 and create a new trade corridor across the valley for SR 152, as well as High-Speed Rail traversing the valley, could intensify the barrier effects of transportation corridors; these projects also create opportunities to enhance existing crossing infrastructure (Section 4.2.3). Proposed development, including commercial development along Highway 101, a proposed sand and gravel quarry in the Sargent Hills, and a proposed autonomous vehicle research and development site south of SR 25 threaten to reduce habitat integrity and connectivity in this focal area (Section 0).

Several prior analyses have been conducted to evaluate wildlife movement through the Pajaro River Focal Area and have identified recommendations to protect and restore this key riparian linkage while reducing development and maintaining compatible working lands in the floodplain (TNC 2004, Gray 2016, Pajaro Compass 2016, Diamond et al. 2022).

**Habitat Protection:** Protection of land in the foothills and along the Pajaro River corridor through the valley is recommended to enable habitat restoration, enhancement, and transportation improvements that can create and maintain multiple pathways of movement through the Upper Pajaro Floodplain. Specific priorities for habitat protection include: 1) upland habitat with high pond density in the southern tip of the Santa Cruz Mountains adjacent to Highway 101, and grasslands north of Soap Lake that adjoin the Diablo Range, where animals can move into and out of the corridor through the valley floor; (Figure 2) agricultural land on the valley floor, with an emphasis on streams and riparian habitat, as well as habitat in the Soap Lake floodplain and adjacent uplands, that can facilitate habitat restoration and enhancement while also contribute to flood resilience of the local communities in the floodplain (Section 4.2.2); and 3) land adjacent to key transportation to facilitate enhancements and maintenance of culverts and bridges that can support wildlife passage (e.g., Highway 101 near Betabel; Section 4.2.3)

**Habitat Restoration and Enhancement:** Collaboration with community members can create opportunities to enhance the compatibility of agricultural lands for wildlife movement on the valley

floor. The Pajaro River corridor and its tributaries, including Uvas-Carnadero and Uvas Creeks, are highly modified but support aquatic species and facilitate terrestrial species movement through agricultural lands (Section 2.2.2). Expanding the areal extent of riparian habitat along the Pajaro River and enhancing riverine habitat in the drainages can facilitate use of these systems by aquatic and terrestrial species as movement corridors and broad linkages that can sustain species moving through the valley floor over multiple generations.

**Transportation Infrastructure Improvements:** Existing crossing structures under the primary roadways (Highway 101, SR 25, and SR 152) are largely functional though could be improved (Section 4.2.3) including by: 1) managing vegetation and sediment build-up at current high-use crossings; 2) installing directional fencing for Tick Creek culvert and Tar Creek overpass on Highway 101, and the culverts on SR 152; and 3) potentially redesigning or creating new crossing structures for SR 152 near roadkill hotspots to provide safe passage for species such as American badger. Connectivity enhancements through planned transportation improvement projects should be developed in collaboration with Caltrans and the Santa Clara Valley Transportation Authority (Table 8).

**Future Studies and Plans:** The following studies and plans are recommended (Section 4.2.4): 1) further evaluate wildlife usage of working lands to inform protection and management; 2) assess and compile land use data at a scale appropriate for connectivity modeling; and 3) develop a habitat protection strategy that can promote effects to protect, restore, and enhance habitat in the linkage while reducing development in the floodplain and maintaining compatible working lands.

## Pacheco Pass

Pacheco Pass is a mountain pass in the Diablo Range, traversed by Pacheco Creek and the adjacent SR 152 (Section 2.2.3). Intact habitat north and south of SR 152, including the protected areas of Henry W. Coe State Park Reserve and Pacheco State Park (**Figure 4**), supports native species including those with large ranges and low population densities such as American badger, mountain lion, and tule elk (*Cervus canadensis nannodes*). Planned infrastructure development in this area, including the Pacheco Reservoir Expansion Project and High-Speed Rail development, threaten to convert available habitat and reduce permeability within the Diablo Range (Table 2). The Habitat Agency is currently developing a feasibility study report to assess the opportunities and constraints of constructing a wildlife overpass in Pacheco Pass (Valley Habitat Agency 2022).

Multiple studies have been conducted to evaluate wildlife movement through Pacheco Pass (Pathways for Wildlife 2020a, Pathways for Wildlife 2021) and have identified strategies for habitat protection along Pacheco Creek and both sides of SR 152, as well as steps to improve habitat permeability and safe passage at crossing sites in SR 152.

**Habitat Protection:** Relatively intact habitat and consolidated land ownership create substantial opportunity to protect habitat, including (Section 4.3.1): 1) riparian protection along Pacheco Creek and connecting streams to maintain the existing movement corridor; and 2) upland habitat that can connect existing protected land and enable grassland habitat enhancement for San Joaquin kit fox and American badger; 3) habitat near concentrated roadkill where transportation infrastructure improvement projects, including directional fencing and a potential overpass, can promote safe passage through SR 152.

**Habitat Restoration and Enhancement:** Habitat in this region is generally intact though could benefit from the following (Section 4.3.2): 1) Riparian restoration in Pacheco Creek to facilitate use of the riparian corridor including during high-flow periods; and 2) well-managed cattle grazing to enhance upland habitat including grasslands and oak woodlands used by tule elk, San Joaquin kit fox, and American badger, which require large areas of intact habitat.

**Transportation Infrastructure Improvements:** While a series of existing culverts and undercrossings occur along SR 152, their usage could be improved through near-term enhancements, including installing directional fencing, clearing sediment and debris, modifying rip-rap, and removing or modifying livestock fences which block structures; some of these improvements are currently being implemented by the Habitat Agency at the Pacheco Creek Reserve Bridge (Pathways for Wildlife 2020a; Table 9). High-Speed Rail development may significantly impact wildlife movement through Pacheco Pass and the design of a new wildlife overcrossing may be critical to safeguarding connectivity, especially for large species such as tule elk and mountain lion which have been killed on the highway (Section 4.3.3).

**Future Studies and Plans:** In addition to the current wildlife overpass feasibility study (Pathways for Wildlife 2021) additional analysis is recommended to examine the feasibility of enhancing existing culverts to improve drainage and create ramps over drop-offs at downstream openings.

## 1 Introduction

Over the past 30 years, numerous studies and plans have identified the importance of maintaining connectivity between the Santa Cruz, Diablo, and Gabilan mountains as critical to conserving biodiversity within the Central Coast Ecoregion through a variety of mechanisms (Box 1). This report synthesizes available information about key landscape linkages to inform future work by the Santa Clara Valley Habitat Agency (Habitat Agency) and its conservation and transportation partners.

### 1.1 Background

The Habitat Agency is responsible for implementing the Santa Clara Valley Habitat Plan (Habitat Plan): a habitat conservation plan and natural community conservation plan (HCP/NCCP) completed in 2012 to protect natural communities and recover endangered species while streamlining permitting of planned development, infrastructure, and maintenance (ICF 2012). The 519,506-acre Plan Area includes the southern two-thirds of Santa Clara County (Figure 1) including the southern Santa Clara Valley and adjoining portions of the Santa Cruz Mountains and the Diablo Range (Section 2.2.1).

The Plan Area is divided into sub-watershed Conservation Analysis Zones (Appendix A) which provide geographic units for targeting conservation actions and land protection through the Reserve System (ICF 2012). The Habitat Plan's conservation strategy includes protection and management of habitat within a Reserve System which will be assembled over the 50-year permit period to achieve biological goals for the landscape, natural communities, including riparian forest and scrub, oak woodland, grassland, and stream habitat, and covered species, which include nine animals (Box 2) and nine plants (ICF 2012).

The Habitat Plan recognizes the importance of habitat connectivity for achieving the biological goals and objectives, by enabling seasonal migration, dispersal, recolonization events, gene flow, and response to climate change. To facilitate such movement, the Habitat Plan synthesized and critically evaluated

#### **Box 1: Habitat Connectivity Values for Maintaining Native Biodiversity**

- Enable migration in response to climate change including movement along elevation and latitudinal gradients (i.e., south to north) so species can stay within their adapted climatic envelopes (tolerances)
- Support species with large home ranges such as mountain lion, for which habitat within each range, or portions thereof, is insufficient to support persisting populations.
- Allow individuals to migrate seasonally, in response to changes in habitat suitability, or to disperse to establish a new territory.
- Facilitate recolonization of habitat patches after a disturbance (e.g., fire) or other factors leading to extirpations or declines.
- Facilitate exchange of genetic material (gene flow) to promote population viability.

#### **Box 2: Santa Clara Valley Habitat Plan Covered Wildlife Species**

Bay checkerspot butterfly  
(*Euphydryas editha bayensis*)

Western pond turtle  
(*Actinemys marmorata*)

California tiger salamander  
(*Ambystoma californiense*)

California red-legged frog  
(*Rana draytonii*)

Foothill yellow-legged frog  
(*Rana boylei*)

Tricolored blackbird  
(*Agelaius tricolor*)

Western burrowing owl  
(*Athene cunicularia hypugaea*)

Least Bell's vireo  
(*Vireo bellii pusillus*)

San Joaquin kit fox  
(*Vulpes macrotis mutica*)

available scientific information about connectivity to identify 20 landscape linkages to connect habitat within the Plan Area, link the Santa Cruz Mountains to the Diablo Range, and support regional connectivity (Appendix A). The linkages were used to inform the design of the Reserve System and guide its assembly.

The Landscape Conservation and Management component of the Habitat Plan conservation strategy identified three primary areas of focus to improve landscape linkages within and beyond the Plan Area (ICF 2012): Coyote Valley, the Upper Pajaro River, and Pacheco Pass (Table 1, Figure 1). When combined with the linkage connecting the Santa Cruz Mountains and Gabilan Range, a portion of which is located south and west of the Plan Area, these three landscape linkages can help maintain interconnected habitat within the Central Coast Range Mountains.

Within the focal areas, the Habitat Plan described a suite of near-term actions to promote connectivity and permeability, including transportation infrastructure improvement projects to facilitate safe passage of wildlife through SR 152 and US Highway 101 (ICF 2012). The Habitat Plan also identified two studies: 1) wildlife movement monitoring, to inform general landscape connectivity as well as covered roads projects; and 2) a feasibility study, to address the relative feasibility of these options (Box 3).

**Box 3: Santa Clara Valley Habitat Plan  
Feasibility Study Questions  
(page 5-81; ICF 2012)**

- Based on existing monitoring data, what feasible engineering options are available, small and large, to improve connectivity for the covered species and for native wildlife in general?
- What is the relative feasibility of these options based on factors such as regulatory permitting, cost, environmental impacts, and land use and safety compatibility?

## 1.2 Purpose and Objectives

Since the Habitat Plan was finalized in 2012, several studies have been conducted to model and monitor wildlife movement in the region (Section 3.3) and evaluate feasibility at the site level, including within the three focal areas for connectivity (Table 1). The purpose of this report is to assemble existing information about landscape connectivity and wildlife movement, and to synthesize recommended strategies to protect and enhance connectivity within the Plan Area and in each of the three focal areas by addressing the following objectives:

1. **Synthesize Existing Information:** Synthesize existing plans, reports, and spatial data from connectivity plans, wildlife tracking studies, and existing transportation ecology analyses, to characterize the landscape linkages and identify data gaps; and
2. **Identify and Recommend Connectivity Improvements:** Based on the existing information and evaluation of land use patterns, summarize the recommended strategies and constraints of habitat protection and restoration, as well as transportation infrastructure improvements, to improve connectivity for the covered species and for native wildlife in general.

This report will provide a basis for site selection as well as general infrastructure guidance to advance multiple potential wildlife connectivity improvement projects. Projects identified in this report may be selected based on their ability to promote one or more connectivity goals. The feasibility of connectivity improvement projects in the sites will then be assessed on a case-by-case basis by addressing in greater detail numerous additional factors that will influence their overall suitability, including engineering feasibility, safety, costs, and regulatory requirements (Box 3).

**Table 1: Description of the connectivity focal areas and relevant connectivity plans and assessments**

Focal Area	Geographic Area	Connectivity Issues (Current and Future)	Key Prior Plan(s)	Current Initiatives and Partners
Coyote Valley	The narrowest point of the Santa Clara Valley between the Santa Cruz Mountains and the Diablo Range north of Morgan Hill.	<ul style="list-style-type: none"> <li>• US Highway 101</li> <li>• Monterey Road</li> <li>• Development (Residential and Commercial)</li> <li>• Agriculture</li> <li>• High-Speed Rail (future)</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Coyote Valley Landscape Linkage: A Vision for a Resilient, Multi-benefit Landscape</i> (SCVOSA and CBI 2017)</li> <li>• <i>Recommendations to reduce wildlife-vehicle collisions on the Monterey Road corridor in Coyote Valley</i> (Wildlife Corridor Technical Working Group 2019)</li> </ul>	<ul style="list-style-type: none"> <li>• Connectivity infrastructure feasibility study (Peninsula Open Space Trust)</li> <li>• Coyote Valley Conservation Areas Master Planning Project (SCVOSA 2021)</li> </ul>
Pajaro River	The riparian corridor and adjacent floodplain along the Upper Pajaro River, which spans between the Diablo and Southern Santa Cruz Mountains south of Gilroy.	<ul style="list-style-type: none"> <li>• US Highway 101 (current and future expansion)</li> <li>• SR 25 (current and future expansion)</li> <li>• SR 152 (current and future expansion)</li> <li>• Proposed development (commercial)</li> <li>• High-Speed Rail (future)</li> </ul>	<i>Enhancing ecological connectivity and safe passage for wildlife on highways between the southern Santa Cruz Mountains, Gabilan Range, and Diablo Range in California</i> (Diamond et al. 2022)	<ul style="list-style-type: none"> <li>• Santa Clara Valley Open Space Authority</li> <li>• San Benito Agricultural Land Trust</li> <li>• Peninsula Open Space Trust</li> <li>• Trust for Public Land</li> </ul>
Pacheco Pass	Area north and south of the Pacheco Creek corridor within the Diablo Range	<ul style="list-style-type: none"> <li>• SR 152 (current and future expansion)</li> <li>• High-Speed Rail (future)</li> </ul>	<i>Wildlife Permeability and Hazards across Highway 152 Pacheco Pass: Establishing a Baseline to Inform Infrastructure and Restoration</i> (Pathways for Wildlife 2020a)	<ul style="list-style-type: none"> <li>• Riparian habitat restoration and transportation infrastructure enhancements</li> <li>• Wildlife overpass feasibility study</li> </ul>

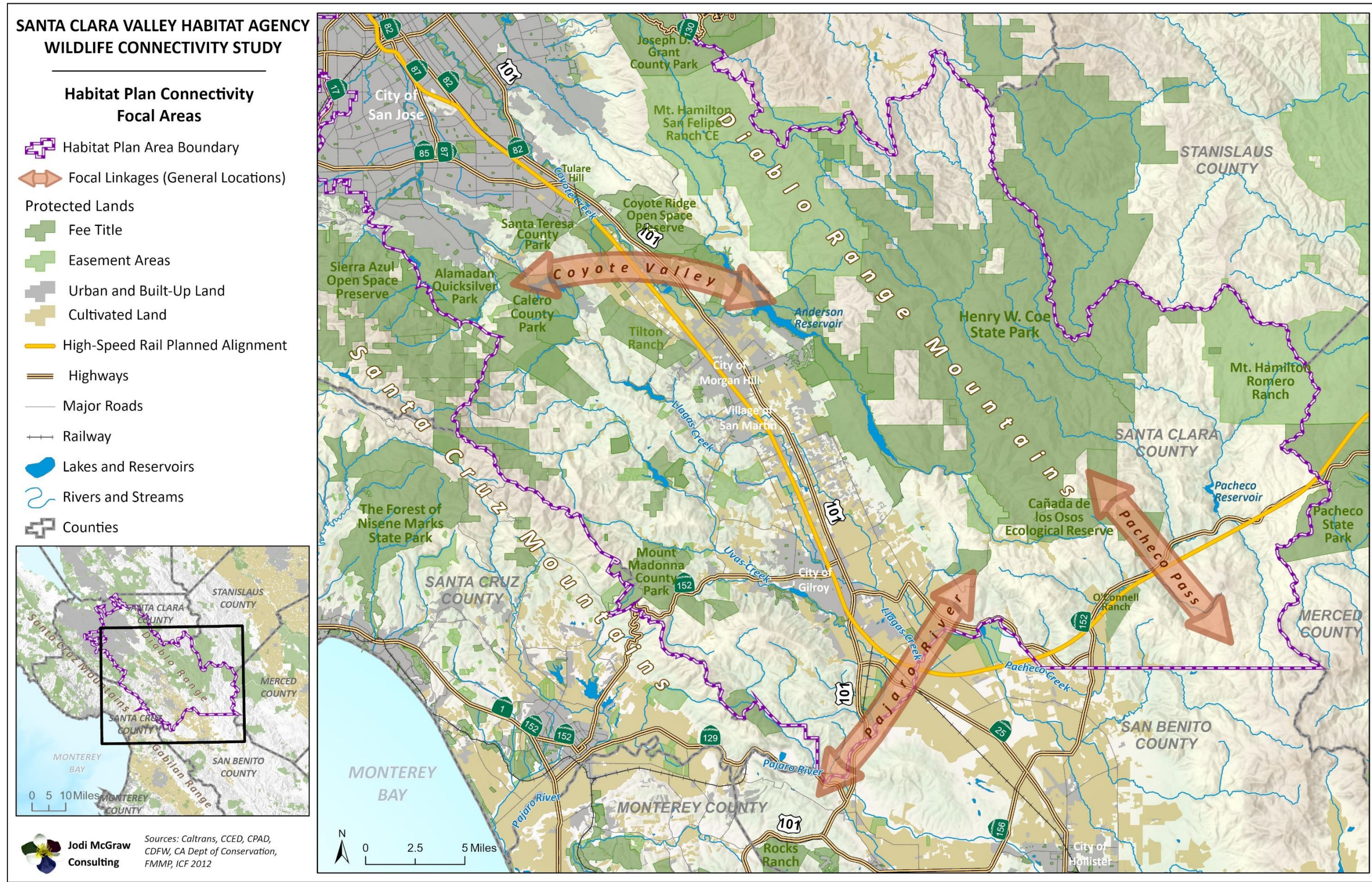


Figure 1: Focal Areas for Habitat Connectivity within the Valley Habitat Plan Area

### 1.3 Project and Report Overview

This report provides the Habitat Agency and its partners with information regarding opportunities and constraints of connectivity enhancement projects in the three focal areas in the following three sections:

1. **Regional Setting (Section 2):** This section describes the Plan Area according to aspects of the landscape that influence connectivity including topography, hydrology, land use patterns, and primary threats to connectivity (Section 2.1.1), and then summarizes the most salient information regarding connectivity in each focal area (Section 2.2);
2. **Existing Connectivity Information (Section 3):** This section describes the methods used in this project to assemble and review existing connectivity literature (Section 3.1) and spatial data (Section 3.2), and provides a table summarizing the findings of the key connectivity studies and plans conducted to date (Section 3.3); and
3. **Connectivity Recommendations (Section 4):** This section summarizes the opportunities, constraints, and recommended strategies to enhance connectivity in each of the three focal areas and the broader region, through habitat protection, restoration, and transportation infrastructure improvements, in each focal area (Sections 4.1 04.3). These recommendations are summarized in a connectivity recommendations matrix (Table 5).

## 2 Regional Setting

This section describes the physical setting and landscape context of the Habitat Plan Area overall (Section 2.1) and the three connectivity focal areas (Section 2.2), with an emphasis on aspects of the landscape that influence connectivity including topography, hydrology, land use patterns, and primary threats.

### 2.1 Landscape Context

#### 2.1.1 General Topography and Land Use

The 519,506-acre Habitat Plan Area is located within central and southern Santa Clara County in central coastal California (Figure 1). The Plan Area is centered on the Santa Clara Valley, which is flanked by the Santa Cruz Mountains to the west and the Diablo Range to the east. At the southern portion of the Plan Area, the Santa Clara Valley abuts the Upper Pajaro Valley which is bounded on the east by the Diablo Range and the west by the southern Santa Cruz Mountains and northern Gabilan Range (Figure 1).

These mountain ranges support a diverse mosaic of native plant communities (habitats) characteristic of the Central Coast Ecoregion, including oak woodland, grassland, coastal scrub, chaparral, and riparian communities which provide core habitat for native plants and animals (TNC 2006). The relatively intact (undeveloped) rugged slopes and ravines of the mountains transition to more gently sloping foothills adjacent to the valley floor, which are dotted with rural residential development, parks, and reservoirs, though, generally speaking land within the mountains is permeable to wildlife movement.

Low-lying land in the Santa Clara Valley and Upper Pajaro Valley has historically been used for agriculture, including farmland and orchards, for more than a century. Over time, the flat terrain has been developed to create the cities of San José, Morgan Hill, Gilroy, and the unincorporated community of San Martin. The northern Plan Area, centered on the city of San Jose, is heavily urbanized; the South Valley is primarily unincorporated and has rural land uses though also features the cities of Gilroy and Morgan Hill (Figure 1).

Surrounding these cities is a matrix of agriculture and low-density, rural residential development across the valley floor, which ranges in width along its length. Narrow constrictions in the valley provide opportunities for connectivity between the mountain ranges. Notably, Tulare Hill, a promontory in the eastern foothills of the Santa Cruz Mountains, is approximately 5,000 feet from the western foothills of the Diablo Range near Metcalf Road (Figure 1). This constriction in the valley marks the northern most edge of what is known as Coyote Valley—the approximately 6-mile-long portion of the southern Santa Clara Valley that extends from Tulare Hill in the north to where Coyote Creek reaches the valley floor in the south near the town of Coyote (Figure 1). These narrow sections of the valley that bring intact habitat within the mountains in close proximity present important regional opportunities for maintaining and enhance connectivity (Penrod et al. 2013).

#### 2.1.2 Transportation Corridors

Owing to their gentle terrain, the southern Santa Clara Valley (including Coyote Valley) and the Upper Pajaro Valley are traversed by major transportation infrastructure, which is proposed for expansion in the near term. The southern Santa Clara Valley (including Coyote Valley) is traversed by U.S. Highway 101, Monterey Highway (the original highway), and an adjacent Union Pacific Rail Line (Figure 1). In the

south, where the Southern Santa Clara Valley meets the Upper Pajaro Valley, Highway 152 connects the towns of Watsonville on the western side of the Santa Cruz Mountains to Gilroy and then the Central Valley (Los Banos) through Pacheco Pass—a low mountain pass through the Diablo Range that uses the Pacheco Creek Valley. The Pacheco Pass has been selected as the route for the San Jose to Merced section of California’s High-Speed Rail, which would traverse the Upper Pajaro Valley and southern Santa Clara Valley (Figure 1; Section 2.1.5).

### 2.1.3 Hydrology

The Plan Area features drainages within the Coyote Creek and Guadalupe River watersheds, which flow to the San Francisco Bay to the north, and the Upper Pajaro River Watershed, which drains the southern portion of the Plan Area to Monterey Bay (Figure 1). These creeks and their tributaries have undergone varying levels of modification due to agriculture and urbanization. Coyote Creek, for example, has been substantially altered through channelization and water storage, and flow is partially regulated by Anderson Dam in the Diablo Range foothills. In the southwest, Uvas Creek and Llagas Creek are channelized in some sections to provide water storage and reduce flooding in Gilroy and Morgan Hill. Uvas, Llagas, Pacheco, and Pescadero creeks are primary tributaries of the Pajaro River, which flows across the southwest Plan Area for approximately 11.7 miles (ICF 2012). Miller’s Canal, an artificial drainage, connects the Upper Pajaro River to Soap Lake (or San Felipe Lake) through San Benito County (Figure 1).

Despite modifications, many of creeks in the Plan Area support aquatic species, including Central Coast and South-Central Coast steelhead (*Oncorhynchus mykiss*), as well as native herpetofauna such as California red-legged frog (*Rana draytonii*). Intact riparian communities including riparian forest and sycamore alluvial woodlands lining these streams serve as natural corridors for plant and animal movement and are particularly important in promoting wildlife movement through urban and agricultural areas (Hilty and Merenlender 2004). Infrastructure associated with streams including culverts and bridges can also facilitate wildlife movement across transportation corridors (Spencer et al. 2010, Phillips et al. 2012; Sections 4.1.1, 4.2.3, and 4.3.3).

### 2.1.4 Existing Protected Lands

The Habitat Plan Area features 184,825 acres of protected lands, which constitute approximately 35% of the total 519,506-acre Plan Area. These existing protected lands include 142,986 acres owned in fee title and 41,855 additional acres protected through easement (CCED 2023, CPAD 2023). These existing protected areas include Henry W. Coe State Park, numerous county parks, several open space preserves, and other lands including private ranches in the Diablo Range and Santa Cruz Mountains which protect thousands of acres of intact habitat that could be connected through the Santa Clara Valley and Upper Pajaro Valley (Figure 1). Agricultural and open space land in the Santa Clara Valley and adjoining Upper Pajaro Valley have also been protected through fee title, conservation easements, and management agreements by the Santa Clara Valley Open Space Authority (Open Space Authority), land trusts, and other conservation organizations with the primary goal of maintaining habitat connectivity between the mountain ranges (ICF 2017).

Many private ranches as well as public lands, such as Santa Teresa County Park and Coyote Ridge Open Space Preserve, are managed through cattle grazing which maintains and enhances habitat conditions and can promote permeability for species including California tiger salamander (*Ambystoma*

*californiense*) and the Bay checkerspot butterfly (*Euphydryas editha bayensis*), by maintaining grasslands (i.e., preventing succession) and controlling dense growth of exotic plants (Barry et al. 2015).

### 2.1.5 Threats to Connectivity

Habitat connectivity within the Plan Area is threatened by urban development, agricultural land conversion, expansion of transportation infrastructure, and climate change.

#### 2.1.5.1 Urban Development

Due to its proximity to a major urban center (Silicon Valley), land within the Plan Area is subject to significant pressure for residential and commercial development, which is particularly intense for agricultural land in the valleys and ranches in the more gently sloping foothills. Urbanization can reduce landscape permeability through the following mechanisms:

- **Habitat loss:** Conversion of low-intensity, semi-permeable agricultural land to residential and commercial development decreases the number and size of suitable habitat patches in the landscape. While some urban-adapted species, such as coyotes, can continue to occupy residential neighborhoods, these areas are generally impermeable to native species including amphibians and large carnivores.
- **Habitat fragmentation:** Linear infrastructure associated with urban development, including roadways, fencing, and utility lines, further divide the landscape and create physical barriers to movement. Urbanization also contributes to increased vehicular traffic on rural roadways, which has an additional barrier effect of reducing successful crossings, such as Santa Teresa Boulevard in Coyote Valley.
- **Anthropogenic disturbance:** Urbanization produces noise and light pollution in residential and commercial areas, as well as recreational trails in open spaces. These disturbances may deter and constrain movement for species like bobcat and deer (Gray 2016, Shilling et al. 2020). Higher vehicular and pedestrian traffic can also contribute to the spread of non-native and invasive species, which affect survival and dispersal of native species.

#### 2.1.5.2 Agriculture

Low-intensity cultivated lands in the Plan Area may support foraging and dispersal by certain species; however, agricultural infrastructure (fences, roads, etc.), intensive practices (e.g., tillage), and additional food safety measures (e.g., pesticides) can degrade ecological function and inhibit connectivity. Exclusionary and livestock fencing directly impedes movement while poorly maintained fences can cause entanglement and injury. Such fencing often blocks wildlife access to existing crossing structures (Pathways for Wildlife 2021).

Increasing demand on local and regional food production systems can lead to encroachment of cropland into riparian habitat (Gennet et al. 2013), which meander through privately owned agricultural properties within the Plan Area and are critical to species movement through agricultural and urbanized areas (Hilty and Merenlender 2004). Some farm and ranching practices can cause streambank erosion, increased sediment and runoff, loss of vegetation, and reduced streamflow. The application of pesticides and rodenticides in crop fields and orchards additionally contribute to animal mortality, reducing functional connectivity and gene flow (Serieys et al. 2021).

### 2.1.5.3 Transportation Infrastructure

A network of high-use roads, highways, and rail lines run through the Plan Area. These transportation corridors reduce available habitat and fragment the landscape through physical barriers and traffic, which can cause vehicle strikes and creates light and noise pollution that can deter animals. Certain mobile species such as mountain lion (*Puma concolor*) can successfully cross transportation corridors that impede movement by low-mobility species including American badger (*Taxidea taxus*), which has a large home range and is subject to mortality along high-use roads (Quinn 2008), which similarly cause vehicle strikes and desiccation of smaller and less mobile species, such as amphibians during dispersal (HT Harvey & Associates 2020). High rates of wildlife-vehicle collisions occur in areas that lack crossing infrastructure (Pathways for Wildlife 2019; Pathways for Wildlife 2020a).

Highways running through the Plan Area include US Highway 101, State Route 152, and State Route 25. Other major roadways featuring heavy traffic include Monterey Road and Santa Teresa Boulevard in Coyote Valley. These highways and roads feature crossing structures including culverts, underpasses, and overpasses, that can facilitate animal movement to varying degrees (Pathways for Wildlife 2019; Pathways for Wildlife 2020a; Diamond et al. 2022).

The effects of transportation on connectivity are anticipated to exacerbated by population growth in Santa Clara County, which is expected to increase traffic along the transportation corridors in the Plan Area (Caltrans 2022a, Huijser et al. 2021), and transportation infrastructure expansion projects which include the following:

1. **Planned Highway Projects:** To accommodate population growth and increased traffic, Caltrans and the Valley Transportation Authority are planning to implement transportation infrastructure projects that could further reduce connectivity through major highway corridors. The significant planned projects in the region include:
  - A. **US Highway 101 Improvement Project:** This multiphase project will modify the Highway 101 and SR 25 interchange (Valley Transportation Authority 2022) and may expand the US 101 to six lanes between Monterey Road and SR 129 (Valley Transportation Authority 2013);
  - B. **State Route 25 Corridor Widening:** This project would widen 11.2 miles of the existing two-lane highway to a four-lane expressway in San Benito and Santa Clara counties and construct an interchange at SR 25 and SR 156, which would require widening SR 156 (Caltrans 2022b); and
  - C. **State Route 152 Trade Corridor Project:** Construction of a new 4-lane highway segment is proposed between Highway 101 and SR 156 as well as modifications to eastbound climbing lanes into Pacheco Pass (Valley Transportation Authority 2020).
2. **High-Speed Rail:** California High-Speed Rail (HSR) is planning construction of the San Jose to Merced section through the Santa Clara Valley and Pacheco Pass (Figure 1). The approximately 90-mile rail line is anticipated to include sections at-grade, on viaduct, and tunnels (California High-Speed Rail Authority 2022a). Construction-related disturbance, landscape fragmentation, and ongoing noise and light pollution will impact connectivity within the three focal areas (Section 2.2). Conservation agencies and organizations in the region have been working closely with the High-Speed Rail Authority to address these impacts through the project design and mitigations, which include dedicated crossing structures (underpass and overpasses) for Coyote Valley and Pacheco Pass to accommodate multiple taxonomic groups with different movement needs (California High-Speed Rail Authority 2022b).

#### 2.1.5.4 Climate Change

Climate change is expected to significantly alter abiotic and biotic conditions of habitat in ways that could influence its suitability for species, including its connectivity function (Ackerly et al. 2012).

The effects of climate change on connectivity include the following:

- **Habitat loss:** Increased temperatures and extreme precipitation patterns are predicted to shift the distribution of biotic communities across environmental gradients. Changes to the physical conditions in the valley may compress the amount of suitable habitat and reduce permeability. Extended drought periods specifically threaten aquatic habitats, which are critical to anadromous fish migration, amphibian breeding, and terrestrial species that rely on aquatic and riparian resources.
- **Population size:** Warmer, drier conditions can directly reduce the ability of some species, such as amphibians, to complete their life cycle. Such reduced population sizes are more vulnerable to the effects of fragmentation and isolation.
- **Wildlife behavior:** The timing and extent of movements at different scales—daily foraging, seasonal breeding or migration, and long-term range shifts—may be substantially altered by climate change. Connectivity is critical strategy to enable species to find resources and complete their life cycle under changing conditions (Spencer et al. 2010).

At the same time, connectivity is a key to species' adaptations to climate change, as it enables animal movement to stay within their adapted climatic envelope as conditions change. Indeed, restoring habitat connectivity to facilitate species migration is a key recommendation for managing biodiversity in the face of climate change (Heller and Zavaleta 2009).

## 2.2 Focal Areas

Based on the analysis of habitat connectivity in the region, the Valley Habitat Plan identified three areas as a focus for habitat connectivity (ICF 2012). This section describes the geography, land use, and key features of these three connectivity focal areas, which are summarized in Table 2. Section 3.3 summarizes the literature documenting their connectivity values which Sections 4.1-4.3 identify specific recommendations for connectivity improvements.

### 2.2.1 Coyote Valley

The Coyote Valley focal area is the approximately 6-mile-long narrowing of the Santa Clara Valley between Tulare Hill just south of the urban edge of San Jose in the north, to where Coyote Creek reaches the valley floor in the south (Figure 1).

Land use in the approximately 2.5-mile-wide section of the valley between the Diablo Range and Santa Cruz Mountains includes rural residential development but is predominantly agricultural and used to grow hay, row crops, or supports orchards. The eastern and western foothills feature ranchlands that support grassland and oak woodlands that provide habitat for species such as the Bay checkerspot butterfly and California tiger salamander (ICF 2012; HT Harvey 2019). Higher intensity development and rural residential zoning is concentrated in the south, near the City of Morgan Hill.

**Table 2: Summary of the geographic setting and connectivity features of the connectivity focal areas**

Aspect	Coyote Valley	Pajaro River	Pacheco Pass
<b>Topography and Hydrology</b>	<ul style="list-style-type: none"> <li>• A narrow valley within the Upper Coyote Creek watershed, between San Jose and Morgan Hill,</li> <li>• Features Coyote Ridge to the northeast and Laguna Seca west of Santa Teresa Blvd.</li> <li>• Coyote Creek and Fisher Creek flow through the valley, with varying levels of intact riparian habitat and modification.</li> </ul>	<ul style="list-style-type: none"> <li>• This valley corridor connects the Diablo Range to the east and the Santa Cruz Mountains to the west, with additional connectivity to the Gabilan Range to the southwest.</li> <li>• The Pajaro River and several creeks and streams flow through the valley, including Uvas and Llagas creeks. These waterways provide habitat and movement corridors for species such as bobcat and deer (Gray 2016).</li> </ul>	<ul style="list-style-type: none"> <li>• A low-elevation pass following Pacheco Creek on the western slope of the Diablo Range.</li> <li>• The riparian corridor is used by small and large wildlife species, including mountain lion (Pathways for Wildlife 2020a).</li> </ul>
<b>Land Use, Ownership, and Zoning</b>	<ul style="list-style-type: none"> <li>• Predominantly open space and low-intensity agricultural land, with more intensively developed land to the north (San Jose) and south (Morgan Hill).</li> <li>• The northern portion of Coyote Valley features larger and less densely developed parcels, and more existing protected lands, than the southern part of the valley.</li> <li>• Large, protected lands include the Coyote Valley and Coyote Ridge open space preserves, Coyote Creek Parkway, Tulare Hill, the North and Mid-Coyote Valley</li> </ul>	<ul style="list-style-type: none"> <li>• Most land in the Upper Pajaro Valley is privately owned and used for large-scale farmland operations with some residential and commercial development nodes.</li> <li>• Land use intensifies from cattle grazing in the south, to large-scale commercial agriculture in the center, which gives way to urbanization in the north (Gilroy).</li> <li>• Riparian habitat innervates agricultural lands in the valley and upland grassland and oak woodlands occur in the southern foothills.</li> </ul>	<ul style="list-style-type: none"> <li>• Land around Pacheco Pass is largely privately owned and used for cattle grazing.</li> <li>• Primarily large ranches, which are bisected by SR 152 which crosses Pacheco Creek in several locations.</li> <li>• A matrix of grassland and oak woodlands (upland) occur north and south of the riparian habitat around Pacheco Creek.</li> <li>• The Habitat Agency’s Pacheco Creek Reserve and the recently acquired O’Connell Ranch Preserve protect nearly 1,200 acres of Pacheco Creek and adjacent hillsides. Additional</li> </ul>

**Table 2: Summary of the geographic setting and connectivity features of the connectivity focal areas**

Aspect	Coyote Valley	Pajaro River	Pacheco Pass
	<p>Conservation areas, and Tilton Ranch.</p> <ul style="list-style-type: none"> <li>The primary roadways include US Highway 101, Monterey Road, Santa Teresa Blvd, and Bailey Ave.</li> </ul>	<ul style="list-style-type: none"> <li>Fee lands and conservation easements protect ~1,500 acres of agricultural land and riparian habitat within the Upper Pajaro valley.</li> </ul>	<p>protected lands include Henry W. Coe State Park and Cañada de Osos Ecological Reserve to the north, and Pacheco State Park in the south.</p>
<b>Threats</b>	<ul style="list-style-type: none"> <li><b>Development:</b> Conversion of agricultural land to residential, commercial, and other developed uses, such as energy facilities.</li> <li><b>Agriculture:</b> Intensive agricultural practices, including orchards and greenhouses.</li> <li><b>Transportation:</b> Monterey Road and Highway 101 are the primary movement barriers. High-Speed Rail would create an additional barrier along the existing railway.</li> <li><b>Incompatible Recreation:</b> park development and intensive uses.</li> </ul>	<ul style="list-style-type: none"> <li><b>Development:</b> Development of agricultural land (ranches and farmland).</li> <li><b>Agriculture:</b> Installation of fencing, vegetation removal, and intensive farming practices that fragment and degrade habitat, including riparian corridors.</li> <li><b>Transportation:</b> Highway 101, SR 25, and SR 152 are impediments to movement. High-speed rail development would traverse the valley.</li> </ul>	<ul style="list-style-type: none"> <li><b>Transportation:</b> <ul style="list-style-type: none"> <li>SR-152 is a priority barrier to movement and a high frequency of roadkill occurs on the highway (Pathways for Wildlife 2020a).</li> <li>High Speed Rail would traverse Pacheco Creek and further fragment the area.</li> </ul> </li> <li><b>Water Projects:</b> The Pacheco Reservoir Expansion Project may reduce habitat and alter wildlife movement patterns (Valley Water District 2021).</li> </ul>
<b>Habitat Plan Covered Wildlife Species</b>	<ul style="list-style-type: none"> <li>Bay checkerspot butterfly</li> <li>Western pond turtle</li> <li>Foothill yellow-legged frog</li> <li>California red-legged frog</li> <li>California tiger salamander</li> <li>Tricolored blackbird</li> <li>Western burrowing owl</li> </ul>	<ul style="list-style-type: none"> <li>Western pond turtle</li> <li>California red-legged frog</li> <li>California tiger salamander</li> <li>Least Bell’s vireo</li> <li>Tricolored blackbird</li> <li>Western burrowing owl</li> <li>San Joaquin kit fox</li> </ul>	<ul style="list-style-type: none"> <li>Western pond turtle</li> <li>Foothill yellow-legged frog</li> <li>California red-legged frog</li> <li>California tiger salamander</li> <li>Least Bell’s vireo</li> <li>Tricolored blackbird</li> <li>Western burrowing owl</li> <li>San Joaquin kit fox</li> </ul>

Coyote Valley features two streams that flow north, with a confluence in north Coyote Valley: Fisher Creek, which is largely channelized, and Coyote Creek, which flows from Anderson Reservoir in the Diablo foothills (Figure 1). North Coyote Valley also features Laguna Seca—a seasonal lake located in the lowest elevation point on the valley floor (75 ft).

Several protected lands in and around Coyote Valley provide breeding, foraging, and dispersal habitat for wildlife (Phillips et al. 2012). Coyote Ridge Open Space Reserve and Coyote Creek Parkway are located to the east, and the Coyote Valley Open Space Reserve and Santa Teresa and Calero County Parks are found to the west. Additional properties have been acquired and protected by the Habitat Agency, Peninsula Open Space Trust (POST) and the Open Space Authority in the last five years. This growing network of open spaces improves the permeability of the valley, which has been identified as one of the only viable connections for wildlife between the Santa Cruz Mountains and the Diablo Range (Penrod et al. 2013).

In 2021, the City of San Jose changed the zoning designation of lands in north Coyote Valley from Industrial to Agricultural and removed the Urban Reserve designation from Mid-Coyote Valley (City of San José 2023). The County of Santa Clara also approved planning for a Climate Overlay Zone for unincorporated Mid- and South-Coyote Valley (County of Santa Clara 2021), limiting the potential for future development in the region and increasing the feasibility and viability of land protections. In 2022, the San José City Council initiated the Coyote Valley Corridor Study to evaluate current and potential land uses in the area east of Monterey Road which will inform future development and design standards for that area (Placeworks 2024).

### 2.2.2 Pajaro River

Situated within the Upper Pajaro Valley, between the Highway 101 corridor and SR 152, the Pajaro River Focal Area has been identified as a region that can provide connectivity between the Santa Cruz Mountains, the Diablo Range, and the Gabilan Range through the Upper Pajaro River Watershed (TNC 2004; Penrod et al. 2013).

Land use in this region is varied and generally intensifies from south to north. Specifically, south of Highway 101 Pajaro River Bridge near Sargent, foothills of the Santa Cruz Mountains and Lomerias Muertas (or Flint Hills) support grassland and oak woodlands that are largely used for cattle grazing. Most of the land to the north is cultivated and gives way to residential and commercial land uses in the City of Gilroy.

Riparian habitat lines the two tributaries to the Pajaro River, Uvas-Carnadero Creek and Llagas Creek, which have confluences with the Pajaro in this area and serve as movement pathways for terrestrial and aquatic species (Gray 2016). The approximately 7-mile Pajaro riparian corridor and surrounding open space is uniquely situated to provide habitat and movement corridors for wildlife travelling from the Santa Cruz Mountains and Gabilan Range to the Diablo Range (Pajaro Compass 2016; Diamond et al. 2022).

Conversion of land to agriculture and urban development broadly threaten this linkage, which may be further impacted by a proposed sand and gravel mine in the hills west of Highway 101 (Figure 1; County of Santa Clara with Technical Assistance by ESA 2022) and a proposed autonomous vehicle testing ground south of SR 25 (County of San Benito 2022) that could constrain access to and from the Southern

Santa Cruz Mountains (Diamond et al. 2022). Transportation infrastructure improvements that may affect this linkage which are described in Section 2.1.5.3 and include:

1. **Highway 101 Improvement Project:** This project includes widening the highway south of Monterey Road to six lanes and construction of a new interchange with SR 25 (Project Phase 1; Valley Transportation Authority 2022);
2. **SR 152 New Trade Corridor Project:** This project includes re-aligning the highway between Highway 101 and SR 156 and potential realignment of SR 25 (Valley Transportation Authority 2020);
3. **SR 25 Widening Project:** This project would expand the highway to a four-lane expressway between San Felipe Road and the SR 156 interchange (Caltrans 2022); and
4. **High-Speed Rail:** The San Jose to Merced segment would entail installation of a rail on embankments and on a viaduct, and development of a station in Gilroy (California High-Speed Rail Authority 2022b).

### 2.2.3 Pacheco Pass

The third focal area is Pacheco Pass—a low mountain pass through the Diablo Range that is crossed by SR 152 (Figure 1), which connects Gilroy in the southern Santa Clara Valley in the west to Los Banos in the Central Valley to the east. Most of the land traversed by the transportation corridor is sparsely developed rangeland, with scattered residential development. The highway generally follows the Pacheco Creek Valley which supports grassland, riparian communities, and oak woodlands with some smaller patches of chaparral. Pacheco Creek, which is a perennial stream, provides a consistent source of water for wildlife and sustains riparian vegetation including sycamore alluvial woodland—a sensitive natural community. The region features several ponds as well as Pacheco Reservoir, which controls outflow to Pacheco Creek. There are multiple bridges where SR 152 crosses over Pacheco, Elephant Head, and Cedar creeks.

Existing protected lands in the area include Cañada de los Osos Ecological Reserve and Henry Coe State Park in the north and Pacheco Creek Reserve, O’Connell Ranch Reserve, and Pacheco State Park to the south of the highway (Figure 1). Land adjacent to SR 152 is mostly privately owned and contained within large ranches.

An expansion project of the Pacheco Creek Reservoir (Figure 1) is planned to increase the current reservoir capacity through construction of a new dam, followed by restoration of the channel between the new dam and existing North Fork Dam (Santa Clara Valley Water District 2021). The project would clear 600-acres of vegetation within and outside the new inundation area and create new infrastructure including water conveyance structures (e.g., pipelines) and access roads from SR 152 to the reservoir (Santa Clara Valley Water District 2021). Changes to water flow regimes are expected during and post-construction, which may impact aquatic habitat conditions and flood risk downstream (Santa Clara Valley Water District 2021)

State Route 152 is the most notable impediment to wildlife movement in the area, as evidenced by the high number of wildlife-vehicle collisions (Pathways for Wildlife 2020a). Large terrestrial species, including mountain lion and tule elk (*Cervus canadensis nannodes*) have been documented using the riparian corridor and have also been recorded as roadkill (Pathways for Wildlife 2020a).

The San Jose to Merced HSR is planned to traverse the SR 152 corridor and connect to the San Joaquin Valley. The HSR alignment would include embankment and aerial sections over Pacheco Creek before transitioning to an anticipated 13.5-mile tunnel and entering at-grade north of San Luis Reservoir. In addition to the alignment infrastructure, temporary and permanent HSR-dedicated infrastructure would be constructed including new access roads, maintenance facilities, and power systems (California High-Speed Rail Authority 2022b).

### 3 Existing Connectivity Information

This section describes the methods used to synthesize existing literature (Section 3.1) and spatial data (Section 3.2) relevant to connectivity in the Plan Area overall and the three focal areas specifically and summarize the most salient information for designing and implementing connectivity projects (Section 3.3).

#### 3.1 Literature Database Assembly

To facilitate the synthesis of existing connectivity information for the region, this project entailed assembly of a bibliographic database containing reports, plans, and studies addressing connectivity. The database was developed through the following steps:

1. Review of existing documents shared by the Habitat Agency;
2. General internet and journal article searches for recent studies and reports; and
3. Outreach to partner organizations for reports or studies not accessible online.

Because it was not feasible to synthesize all documents related to connectivity, documents were selected which addressed aspects of wildlife movement or connectivity within the Plan Area, the focal areas, or other regionally relevant areas.

Those implementing connectivity projects may find it helpful to review additional documents about the covered species or habitat connectivity.

The electronic documents were stored in a file database that was indexed using Zotero reference management software (Zotero v.6 2022). This file database includes citation information, as well as keyword tags associated with each document for filtering which are listed in Box 4. The most relevant information to inform connectivity work was summarized as outlined in Section 3.3.

#### 3.2 Spatial Connectivity Data

To facilitate future connectivity analyses and project planning and implementation, a spatial database was created from existing, readily available GIS data layers related to wildlife and landscape connectivity. Data sources were identified primarily through literature review (Section 3.1) and downloaded from public databases and through outreach to Habitat Agency and its partners.

The database is comprised of statewide and regional connectivity analyses and local studies on transportation ecology. The data include linkage designs, protected area boundaries, and wildlife

#### Box 4: Connectivity Literature Database Keyword Tags

- **Geographic Region:** Bay Area, CA, Central Valley, Central Coast
- **Mountain Range:** Diablo Range, Gabilan Range, Santa Cruz Mountains
- **County:** Monterey County, Santa Barbara County, Santa Clara County, Santa Cruz County, San Luis Obispo County
- **Focal Area:** Coyote Valley, Pacheco, Pajaro
- **Highway:** Hwy 101, SR 25, SR 15
- **Species:** amphibians, badger, bobcat, deer, mountain lion, pond turtle, reptiles, tiger salamander
- **Organization:** CDFW, Caltrans, POST, SCVOSA, Valley Transportation Authority: VTA
- **Topic:** barriers, camera trap, climate, GPS, linkage design, monitoring study, noise, roadkill, strategies

crossing infrastructure. A brief description of the datasets, source organization, and geographic extent are summarized in Table 3.

### 3.3 Connectivity Information Summary

To assess feasibility and assemble recommendations for connectivity projects, JMc reviewed key connectivity plans, reports, and studies compiled in the literature database (Section 3.1) and available spatial data (Section 3.2). Table 4 summarizes the key findings and recommendations for each document, and identifies the geographic area assessed, the approach used in the assessment, a summary of key findings related to each focal area, and any species addressed. To provide the broader context for the region, statewide connectivity analyses are summarized first followed by the regional analyses and then transportation ecology studies, which focus on the impacts of roads and other transportation networks on wildlife movement.

Santa Clara Valley Habitat Plan  
Wildlife Connectivity Report

**Table 3: Summary of spatial data addressing wildlife connectivity and movement in the Plan Area**

Source Project	Reference	Dataset Name	Description	Geographic Area	Coyote Valley	Pajaro River	Pacheco Pass
<b>Linkages and Connectivity Models</b>							
Present-Day Connectivity	TNC 2018	Omniscape	Raster classifying landscape permeability in five categories based on general permeability based on circuitscape: diffuse, permeable, impeded, intensified, or channelized.	Statewide	✓	✓	✓
California Essential Habitat Connectivity	Spencer et al. 2010	California Essential Habitat Connectivity Database	Database including areas of intact and largely protected lands, or Natural Landscape Blocks, and connectivity areas which link at least two Landscape Blocks.	Statewide	✓	✓	✓
Bay Area Critical Linkages	Penrod et al. 2013	Bay Area Critical Linkages Database	Linkage designs based on focal species within the broader Bay Area and linear features identifying Key Riparian Corridors and highway barriers.	Bay Area and Adjacent Counties	✓	✓	✓
<b>Connectivity-Related Infrastructure</b>							
California Wildlife Movement Barrier Priorities	CDFW 2022	Wildlife Movement Barriers	Statewide dataset of transportation infrastructure considered priority barriers to wildlife movement.	Statewide	✓	✓	✓
Coyote Valley Wildlife Permeability Infrastructure	Coyote Valley Subcommittee, Santa Clara County Wildlife Corridor Technical Working Group 2017	Coyote Valley Wildlife Permeability and Infrastructure Database (WPID)	Database including potential crossing infrastructure, highway overpasses, fencing locations, and creeks in Coyote Valley.	Coyote Valley	✓		

**Table 3: Summary of spatial data addressing wildlife connectivity and movement in the Plan Area**

Source Project	Reference	Dataset Name	Description	Geographic Area	Coyote Valley	Pajaro River	Pacheco Pass
Southern Santa Cruz Mountains Wildlife Connectivity Study	POST 2022	Southern Santa Cruz Mountains WPID	Database including potential crossing infrastructure, highway overpasses, and barriers in the Upper Pajaro Valley and Aromas Hills.	Upper Pajaro Valley and Aromas Hills		✓	
State Route 152 Wildlife Permeability Infrastructure	Santa Clara Valley Habitat Agency 2019	SR-152 WPID	Database including potential crossing infrastructure, highway overpasses, and barriers on SR-152 from SR 156 to Merced County.	Pacheco Pass			✓
<b>Other Resources</b>							
Conservation Lands Network	Bay Area Open Space Council 2019	CLN 2.0 Database	Collection of datasets relevant to conservation planning in the Bay Area, including environmental, political, climatic, and biotic layers.	Statewide	✓	✓	✓

Table 4: Summary of existing plans, reports, and studies addressing connectivity in the Plan Area and focal areas					
Study	Geographic Area	Approach	Findings	Recommendations	Species Addressed
<b>Statewide Connectivity Plans: Analyses and plans that evaluate connectivity throughout California</b>					
California Missing Linkages Project (Penrod et al. 2001)	Statewide assessment that included the following relevant regions: <ul style="list-style-type: none"> <li>• Bay Area; and</li> <li>• Central Coast.</li> </ul>	Experts convened to identify ‘linkages’, ‘missing links’ or ‘choke points’ throughout the state. The linkages were also scored on the overall feasibility of conservation, from ‘not feasible’ to ‘good opportunity.’	<ul style="list-style-type: none"> <li>• <b>Coyote Valley:</b> Identified as a connectivity choke point; it was ranked as Good Opportunity for conservation priority.</li> <li>• <b>Pacheco Pass:</b> Identified as a Moderate Opportunity linkage for mountain lion and medium carnivores</li> <li>• <b>Pajaro River:</b> Considered a riparian linkage but no additional detail was included on conservation feasibility. Two additional riparian linkages, which connect to the Pajaro were also identified:</li> <li>• <b>Llagas Creek:</b> In the Gilroy Region, this was designated as a missing linkage with Moderate Conservation Opportunity to improve streamflow and riparian habitat for Least Bell’s vireo.</li> <li>• <b>Uvas Creek:</b> A choke point with Good Conservation Opportunity; it was characterized as important for migratory bird species and steelhead salmon</li> </ul>	Restoration and research recommendations were provided by experts for the following linkages: <ul style="list-style-type: none"> <li>• <b>Pacheco Pass:</b> Collaboration with CalTrans should be used to prompt the design of wildlife permeable underpasses/overpasses and the collection of roadkill data; and</li> <li>• <b>Llagas Creek and Uvas Creek:</b> Urban creek restoration and riparian revegetation can improve usability of riparian habitat by migratory birds.</li> </ul>	This was not a species-focused assessment but the linkage-specific recommendations for riparian conservation highlight steelhead trout and migratory birds.
California Essential Habitat Connectivity Project (Spencer et al. 2010)	Statewide assessment that included the following relevant ecoregions: <ul style="list-style-type: none"> <li>• Bay Area; and</li> <li>• Southern Central Coast.</li> </ul>	Spatial analyses were used to connect large ‘Natural Landscape Blocks’, including portions of the Santa Cruz and Diablo ranges, using least cost paths based on ‘ecological integrity’ of the land between the blocks (rather than individual species habitat).	Connectivity is identified through the Santa Clara Valley through these focal areas: <ul style="list-style-type: none"> <li>• <b>Coyote Valley:</b> The valley is covered as a Connectivity Area, with generally moderate permeability.</li> <li>• <b>Pajaro River:</b> Considered an important corridor between the Santa Cruz Mountains and western Diablo Range.</li> <li>• The model did not capture the <b>Pacheco Pass</b> linkage across SR 152, likely because the Diablo Range is covered as a contiguous Natural Landscape Block</li> </ul>	<ul style="list-style-type: none"> <li>• The statewide linkage designs should be replaced by regional analyses.</li> <li>• The <i>Bay Area Critical Linkages and Beyond</i> project (Penrod et al. 2013) provided such a regional analysis for the linkages.</li> </ul>	This is not a species-specific analysis and instead, looks at ecological integrity.
Omniscape (TNC 2018)	Statewide, continuous coverage	This tool uses spatial analyses to characterize the entire landscape’s contribution to connectivity and animal movement through the landscape into one of three main categories: diffuse, impeded, or intensified and channelized.	<ul style="list-style-type: none"> <li>• <b>Coyote Valley:</b> Largely classified as featuring ‘intensified or channelized movement,’ where animal movement is anticipated to be concentrated due to barriers elsewhere.</li> <li>• <b>Pacheco Pass:</b> Within the Diablo Range, the western section of SR 152 is primarily ‘diffuse or limited movement,’ indicating moderate permeability for animal movement; however, higher ‘channelized’ movement occurs further east, indicating movement may be funneled towards the area.</li> <li>• <b>Pajaro River:</b> The Pajaro River/Highway 101 corridor features a large area of ‘diffuse’ movement but further north, in rural and developed land, movement is ‘impeded’ or highly restricted.</li> </ul>	General conservation strategies were identified based on the three categories of movement: <ul style="list-style-type: none"> <li>• <b>Diffuse:</b> In areas of diffuse movement like Pacheco Pass and the portions of the Pajaro River, maintain permeability through land use planning and public policy;</li> <li>• <b>Intensified or channelized:</b> In areas like Coyote Valley, where movement is intensified or channelized, prevent choke points through land protection, acquisition, and habitat restoration; and</li> <li>• <b>Impeded:</b> In areas like the northern portion of the Pajaro River linkage, restore connectivity through habitat restoration.</li> </ul>	This is not a species-specific analysis and instead, looks at landscape condition.

Table 4: Summary of existing plans, reports, and studies addressing connectivity in the Plan Area and focal areas					
Study	Geographic Area	Approach	Findings	Recommendations	Species Addressed
California Wildlife Barriers (CDFW 2022)	Statewide assessment that included the Bay Delta Region, which covers the Santa Clara Valley Habitat Plan Area and the Central Region, south of the Plan Area.	This assessment identified key transportation infrastructure barriers within each CDFW Region using existing data on connectivity and animal movement. Ten 'Priority' barrier segments were identified in each CDFW Region and these were evaluated to identify two 'Top Priority' barriers in each region (twelve statewide) according to a set of criteria including coverage of the linkage under regional habitat plans, importance to sensitive species, and the habitat condition of the surrounding area.	Seven transportation infrastructure barriers, including two regional 'Priority' and two statewide 'Top Priority' barriers were identified in and adjacent to the Plan Area. These were all considered important for mesocarnivores (e.g., coyote, fox, and bobcat), mule deer, and mountain lion, as well as additional segment-specific species as noted below: <ul style="list-style-type: none"> <li>• <b>Coyote Valley:</b> Santa Teresa Blvd (W159), Bailey Avenue (W160), and McKean Road (161) are local barriers, while Hwy 101 Metcalf/Burnett (W022) was considered a Priority Barrier that is also important for California tiger salamander, California red-legged frog, western pond turtle, and badger;</li> <li>• <b>Pajaro River:</b> Hwy 101 Old Monterey/Hwy 129 (W024) was identified as a Top Priority barrier for the state and Hwy 101 Prunedale (W041), south of the Plan Area, is a Priority Barrier (CDFW Central Region); and</li> <li>• <b>Pacheco Pass:</b> Hwy 152 Pacheco Pass/San Luis Reservoir (W030) was identified as a Top Priority barrier, additionally important for tule elk and badger.</li> </ul>	The report recommends barrier-specific research to assess the location and type of remediation actions needed, as multiple strategies may be appropriate for longer barrier segments, with multiple impediments.	Covered species: <ul style="list-style-type: none"> <li>• California tiger salamander</li> <li>• California red-legged frog</li> <li>• Western pond turtle</li> </ul> Other species: <ul style="list-style-type: none"> <li>• Mesocarnivores</li> <li>• Mule deer</li> <li>• Mountain lion</li> <li>• Badger</li> <li>• Tule elk</li> </ul>
<b>Regional Connectivity Plans: Analyses and plans that evaluate connectivity in the Bay Area and Central Coast regions of California</b>					
Bay Area Critical Linkages and Beyond (Penrod et al. 2013)	Bay Area-focused assessment which covers portions of three California ecoregions: <ul style="list-style-type: none"> <li>• Central Coast;</li> <li>• North Coast; and</li> <li>• Central Valley</li> </ul>	This plan used spatial analyses to connect large landscape blocks in the Santa Cruz Mountains, the Gabilan Range, and the Diablo Range using least cost corridor analysis for sets of focal species. Additionally, key riparian corridors were identified by buffering streams for four focal fish species by 1 km on either side.	Several linkages significantly overlap within the Habitat Plan Area, emphasizing the connectivity value of the area, specifically for the following focal species analyzed: mountain lion, bobcat, badger, black-tailed deer, and California quail. <ul style="list-style-type: none"> <li>• <b>Coyote Valley:</b> A high-permeability connection for all five species, from the Santa Cruz Mountains to Diablo Range, crosses Highway 101 in the north, from Tulare Hill to Metcalf Canyon. A lower permeability linkage, directly through Coyote Valley, was identified for mountain lion and black-tailed deer.</li> <li>• <b>Pajaro River:</b> Another Santa Cruz-Diablo Range connection, the area is also considered a Key Riparian Corridor supporting steelhead trout.</li> <li>• <b>Pacheco Pass:</b> This area is covered by two linkages: the Diablo Range to Inner Coast Range on the east side and the Diablo Range to the Gabilan Range in the west. These linkages were modeled using San Joaquin kit fox, Tule elk, and ringtail as additional focal species. Existing bridge structures across SR-152 were identified as supporting permeability.</li> </ul>	<ul style="list-style-type: none"> <li>• Riparian habitat and natural flow processes can be protected and improved through riparian vegetation buffers (&gt;200 m wide), prevention and eradication of invasive species, and not hardening riverbanks.</li> <li>• Planning and development of high-speed rail projects through Coyote Valley should include high quality wildlife crossing structures which minimize sound and light disturbance.</li> <li>• Maintenance of existing crossing structures and installation of directional fencing and signage are recommended to direct wildlife to permeable areas along SR-152.</li> </ul>	Covered species: <ul style="list-style-type: none"> <li>• San Joaquin kit fox</li> </ul> Other species: <ul style="list-style-type: none"> <li>• Mountain lion</li> <li>• Bobcat</li> <li>• Badger</li> <li>• Black-tailed deer</li> <li>• California quail</li> <li>• Ringtail</li> <li>• Tule elk</li> <li>• Steelhead trout</li> </ul>

Table 4: Summary of existing plans, reports, and studies addressing connectivity in the Plan Area and focal areas					
Study	Geographic Area	Approach	Findings	Recommendations	Species Addressed
Santa Cruz Mountains Linkages Conceptual Area Protection Plan (McGraw 2012)	Focused on Santa Cruz Mountain linkages from the Bay Area Critical Linkages Project, which was divided into five planning units: <ul style="list-style-type: none"> <li>• Coyote Valley;</li> <li>• Gabilan Range;</li> <li>• Santa Cruz Mountains;</li> <li>• Santa Cruz to Gabilan; and</li> <li>• Upper Pajaro.</li> </ul>	This plan used a collaborative linkage design process based upon the Bay Area Critical Linkages Project (Penrod et al. 2013) and ground truthing of the linkage choke points to prioritize land for protection within the Santa Cruz Mountains Linkages. Parcels included in the CAPP were rated within four tiers of conservation value: critical, key, important, or facilitative. Inclusion of parcels in a conceptual area protection plan (CAPP) can facilitate use of state funding from the Wildlife Conservation Board to protect land via conservation easement or fee title acquisition.	<ul style="list-style-type: none"> <li>• <b>Coyote Valley:</b> Recognized as a choke point with predominantly Critical and Key land parcels—areas essential to maintaining connectivity—on either side of the transportation corridor.</li> <li>• <b>Pajaro River:</b> Critical land parcels were identified along the Upper Pajaro with four points of existing connectivity infrastructure (culverts and overpasses).</li> <li>• <b>Pacheco Pass:</b> This area was not evaluated but the report highlights potential infrastructure developments with implications for wildlife connectivity, including highway expansion and High-Speed Rail.</li> <li>• Transportation crossing infrastructure improvements were also recommended for each area; however, subsequent plans and reports present more recent and refined recommendations.</li> </ul>	<p>Locality specific recommendations were made by linkage, as follows:</p> <ul style="list-style-type: none"> <li>• <b>Coyote Valley:</b> Improvements to transportation infrastructure should support multiple crossing points, specifically maintenance of culverts; and</li> <li>• <b>Pajaro River:</b> Regular culvert clearing and directional fencing can increase usability of existing crossings.</li> </ul>	Focal species are the same as the Bay Area Critical Linkages project, above.
Wildlands Conservation in the Central Coast Region of California (Thorne et al. 2002)	Central Coast focused assessment which identified three relevant linkages in the Plan Area: <ul style="list-style-type: none"> <li>• Northern Diablo Range to Southern Diablo Range;</li> <li>• Santa Cruz Mountains to the Northern Diablo Range); and</li> <li>• Santa Cruz Mountains to the Southern Diablo Range.</li> </ul>	This plan used spatial analysis to identify least cost paths (i.e., path of least resistance and distance) between core habitat for mountain lion in the Central Coast.	<p>The analysis identified Coyote Valley and Pacheco Pass as important linkages for mountain lion:</p> <ul style="list-style-type: none"> <li>• <b>Coyote Valley:</b> Recognized as a key linkage between the Santa Cruz Mountains and Diablo Range, with limited permeability and significant threat of urban development;</li> <li>• <b>Pacheco Pass:</b> The assessment considered this linkage (northern to southern Diablo Range) as generally permeable agricultural land but identified potential pressure of development and degradation of habitat from overgrazing; and</li> <li>• <b>Pajaro River:</b> The linkage from the Santa Cruz Mountains to the southern Diablo Range connects through the Gabilan Range. However, moderate permeability was identified in the Pajaro River focal area along Hwy 101.</li> </ul>	<p>Linkage-specific recommendations include the following:</p> <ul style="list-style-type: none"> <li>• <b>Coyote Valley:</b> Local-scale research and planning are recommended to identify connectivity enhancement; and</li> <li>• <b>Pacheco Pass:</b> Collaborate with local ranch-owners to protect habitat and engage in connectivity planning.</li> </ul>	<ul style="list-style-type: none"> <li>• Mountain lion</li> <li>• Connectivity was assessed for San Joaquin kit fox, but no linkages were identified in the Plan Area because of fragmentation.</li> </ul>

Table 4: Summary of existing plans, reports, and studies addressing connectivity in the Plan Area and focal areas					
Study	Geographic Area	Approach	Findings	Recommendations	Species Addressed
<b>Transportation Ecology: Studies and Plans that Assess Animal Movement through Highways and Crossing Infrastructure</b>					
Coyote Valley Linkage Assessment Study (Diamond and Snyder 2016)	Local-scale study in Coyote Valley	This study used camera monitoring and roadkill surveys to assess crossing structure usage and movement patterns for wildlife across north Coyote Valley.	Field camera data from 12 monitoring sites in north <b>Coyote Valley</b> showed that Fisher Creek was a heavily used corridor, with similar detection rates as the adjacent protected habitats (Coyote Creek County Park and the Open Space Reserve). The study identified roadkill hotspots nearby to blocked culverts and described the following specific barriers to movement: <ul style="list-style-type: none"> <li>• Exclusionary fencing along Fisher Creek at Bailey Avenue and Fisher Creek at Palm Drive;</li> <li>• Blocked culverts at Coyote Ranch on Hwy 101, Bailey culvert at Hwy 101, and Fisher Creek at Monterey Road; and</li> <li>• The concrete and fence median barrier along Monterey Road.</li> </ul>	The study identified three priority recommendations for barrier removal: <ul style="list-style-type: none"> <li>• Remove or modify exclusionary fencing at Fisher Creek bridges and prioritize restoration of adjacent riparian habitat;</li> <li>• Remove debris and fencing from culverts on Hwy 101, at Bailey exit and Coyote Ranch; and</li> <li>• Install directional fencing and clear riprap from the Fisher Creek crossing at Monterey Road.</li> </ul>	<ul style="list-style-type: none"> <li>• Deer</li> <li>• Coyote</li> <li>• Bobcat</li> <li>• Gray fox</li> <li>• Small mammals, such as California ground squirrel</li> </ul>
Recommendations to reduce wildlife-vehicle collisions on the Monterey Road corridor in Coyote Valley, Santa Clara (Coyote Valley Subcommittee, Santa Clara County Wildlife Corridor Technical Working Group 2019)	Local-scale study in North Coyote Valley	The Coyote Valley Subcommittee of the Santa Clara County Wildlife Corridor Technical Working Group synthesized existing data and literature to make updated recommendations for enhancing connectivity in north Coyote Valley.	The Wildlife Corridor Technical Working Group developed small and large-scale connectivity enhancement projects for Monterey Road. These were largely based on findings from roadkill and movement monitoring by Pathways for Wildlife who identified the following issues: <ul style="list-style-type: none"> <li>• The highest concentration of roadkill was on Monterey Road, between Bailey and Metcalf Roads; and</li> <li>• Fisher Creek culvert at Monterey Road is subject to seasonal flooding and is not functional for species like deer because of riprap at the western entrance.</li> </ul>	<ul style="list-style-type: none"> <li>• In the short term, recommendations include installation of driver warning signage at the intersection of Monterey and Bailey Roads, reducing the speed limit to improve traffic safety, and increasing the size of existing intersection median gaps.</li> <li>• Long-term, higher investment recommendations include building two new underpasses and retrofitting the Fisher Creek culvert.</li> </ul>	This is not a species-specific report and instead focuses on transportation infrastructure improvements
Coyote Valley Bobcat and Gray Fox Connectivity Study: Wildlife-Vehicle Collision Analysis & Report (Pathways for Wildlife 2019)	Local-scale study in Coyote Valley	For this analysis, roadkill data were collected in Coyote Valley, both opportunistically and from systematic surveys. The study also incorporated mortality data from Diamond and Snyder (2016). Spatial hotspot analysis was used to identify significant clusters of roadkill occurrence.	Roadkill data from 2006-2010 and 2014-2018 revealed the following about wildlife-vehicle collisions in the <b>Coyote Valley</b> area: <ul style="list-style-type: none"> <li>• Monterey Road accounts for over 50% of all roadkill in the area;</li> <li>• The area between Metcalf Road and Bailey Ave was a significant hotspot for wildlife-vehicle collisions; and</li> <li>• The rate of roadkill incidents did not vary seasonally but is consistent year-round.</li> </ul>	This assessment supports previous recommendations of culvert enhancements and a new crossing design from the Coyote Valley Landscape Linkage (Open Space Authority and Conservation Biology Institute 2017) and Recommendations to reduce wildlife-vehicle collisions from the Coyote Valley Subcommittee, Santa Clara County Wildlife Corridor Technical Working Group (2019).	<ul style="list-style-type: none"> <li>• Bobcat</li> <li>• Coyote</li> <li>• Deer</li> <li>• Badger</li> <li>• California ground squirrel</li> <li>• Mountain lion</li> <li>• Gray fox</li> </ul>

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Study	Geographic Area	Approach	Findings	Recommendations	Species Addressed
Coyote Valley Bobcat Habitat Preference and Connectivity (Serieys and Wilmers 2019)	Local-scale study in Coyote Valley	The Wilmers Lab at UCSC were commissioned by POST and the Open Space Authority to assess habitat connectivity in Coyote Valley by tracking radio collared bobcats. Spatial modeling was used to assess habitat preference and response to human disturbance. Road crossing hotspots were identified using kernel density estimation. Results from both Coyote Valley and the Aromas Hills were integrated in Serieys et al. 2021.	Radio tracking of 25 individuals for an average of 5 months revealed that bobcats in the <b>Coyote Valley</b> area: <ul style="list-style-type: none"> <li>• Preferentially used areas featuring trees and shrubs and avoided row crops, and areas within 100 meters of residential neighborhoods;</li> <li>• Crossed major roads in topographical depressions featuring tree and shrub cover on both sides of the road, often using culverts; and</li> <li>• Rarely crossed Monterey Road safely but more frequently crossed Hwy 101, at vegetated underpasses.</li> </ul>	<ul style="list-style-type: none"> <li>• Install directional fencing for existing road-crossing hotspots.</li> <li>• Remove or reduce movement impediments including debris and sediment build up in culverts and underpasses, and fencing.</li> </ul>	Bobcat
Coyote Valley Reptile and Amphibian Linkage Study (HT Harvey 2020)	Local-scale study in Coyote Valley	This study modeled least cost pathways across Coyote Valley for three amphibian and reptile species. The analysis used existing data on land use, land cover, and existing linkage structures, supplemented with field surveys of habitat and linkage conditions.	In <b>Coyote Valley</b> , the primary barriers to movement for California red-legged frog, California tiger salamander, and western pond turtle included the following: <ul style="list-style-type: none"> <li>• Impassable culverts and concrete medians on Hwy 101 and Monterey Road;</li> <li>• A lack of usable aquatic (ponds and creeks) or terrestrial (upland or grassland) habitat near potential crossing points; and</li> <li>• The presence of non-native predators (fish and bullfrogs) in aquatic habitat.</li> </ul> <p>The area north of Laguna Avenue was identified as the best opportunity for creating linkages for the focal species.</p>	<ul style="list-style-type: none"> <li>• Creating new “stepping stone” ponds near existing and potential crossing points would increase the dispersal of California red-legged frogs and California tiger salamander.</li> <li>• Reducing non-native predator populations (fish and bullfrog) in Coyote Creek and Laguna Seca may increase use of existing aquatic habitat.</li> <li>• Wildlife-friendly crossing infrastructure could be added to Metcalf Road, with exclusion fencing, to direct amphibians and western pond turtle across Hwy 101 and Coyote Creek</li> </ul>	<ul style="list-style-type: none"> <li>• California red-legged frog</li> <li>• California tiger salamander</li> <li>• Western pond turtle</li> </ul>
Informing Connectivity Planning in the Coyote Valley through Puma Habitat Selection in Patchy Environments (Suraci and Wilmers 2021)	Santa Cruz Mountains and local-scale connectivity in Coyote Valley	This study used GPS telemetry data from 12 mountain lions to evaluate fine-scale habitat selection within sparse habitats in three focal areas of the Santa Cruz Mountains: coast north of Santa Cruz, eastern foothills south of San Jose, and the southern tip of the mountains. Connectivity through	The habitat specificity analyses and circuit-scape modelling revealed: <ul style="list-style-type: none"> <li>• Mountain lions utilize areas featuring native shrubs, including coastal scrub and riparian vegetation, rather than tree stands (e.g., live oak), to move through sparsely vegetated areas (e.g., grasslands);</li> <li>• Revegetated patches should be spaced approximately 100-200 m apart to promote mountain lion movement.</li> <li>• Increased vegetation in the absence of new crossing infrastructure may exacerbate bottlenecks around existing crossing sites; and</li> </ul>	<ul style="list-style-type: none"> <li>• Enhance vegetative cover along Fisher Creek.</li> <li>• Create shrubland patches of adequate size (i.e., greater than 400 m<sup>2</sup>) and minimal spacing (i.e., less than 200 m), specifically in areas of greater development density.</li> <li>• Create additional transportation crossing infrastructure in proximity to restored vegetation patches.</li> </ul>	Mountain lion

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		Coyote Valley was then modeled for both current conditions and under five potential restoration scenarios for vegetation enhancement and crossing infrastructure creation.	<ul style="list-style-type: none"> <li>Additional crossing sites greatly increase potential connectivity, even in the absence of revegetation.</li> </ul>		
North Coyote Valley Road Ecology Study (Diamond and Sandoval 2023)	Local-scale study in Coyote Valley	From March 2021-June 2022, camera trap data were collected at five existing road crossing structures, five sites at gates and at-grade with roads, and four locations along fence lines. Weekly roadkill surveys were additionally conducted for five roadways throughout the study period.	<p>Twelve months of monitoring and roadkill surveys revealed the following about wildlife movement in north Coyote Valley:</p> <ul style="list-style-type: none"> <li>High rates of movement occur at grade, specifically on Bailey Ave and Santa Teresa Blvd;</li> <li>Sediment and debris build up in culverts and bridge undercrossings are associated with decreased use of these structures;</li> <li>Fencing restricts movement by large mammals, specifically at Laguna Seca and west of Santa Teresa Blvd; and</li> <li>Monterey Road and Highway 101 both feature high rates of wildlife vehicle collisions, associated with a lack of dedicated crossing infrastructure.</li> </ul>	<p>In the North Coyote Valley Conservation Area, the following enhancements were recommended to increase permeability and reduce wildlife vehicle collisions:</p> <ul style="list-style-type: none"> <li>Clear sediment and debris from crossing structures, including Fisher Creek Bridge at Bailey Ave;</li> <li>Retrofit existing culverts at Santa Teresa Blvd, which hold water year-round, or create new crossing infrastructure;</li> <li>Replace sections of restrictive fencing with a wildlife-friendly design and install wildlife-friendly cattle fencing adjacent to Fisher Creek; and</li> <li>Install exclusionary fencing along Highway 101 to reduce crossings at-grade.</li> </ul>	<ul style="list-style-type: none"> <li>Deer</li> <li>Coyote</li> <li>Bobcat</li> <li>American badger</li> <li>Gray fox</li> <li>Raccoon</li> <li>Striped skunk</li> <li>Wild pig (<i>Sus scrofa</i>)</li> </ul>
The Nature Conservancy's Pajaro Study (Diamond and Snyder 2013)	Local-scale study in the Upper Pajaro Valley	During 2012-2013, camera trap data were collected from 19 sites at a variety of habitats and transportation infrastructure crossings in the Upper Pajaro Valley.	<p>Camera monitoring sites in the valley floor and adjacent upland habitats, revealed the following:</p> <ul style="list-style-type: none"> <li>Creek confluences and riparian undercrossings in the valley—Tick Creek with Uvas Creek, Pajaro River and Uvas Creek, Llagas and Jones Creek, Tar Creek at Hwy 101—had higher detections than sites of intact oak-woodland habitat at Star Creek Ranch;</li> <li>Wildlife used riparian habitat to move through cultivated agricultural land;</li> <li>Movement corridors in the valley were used for adult bobcat movement as well as natal dispersal.</li> </ul>	<ul style="list-style-type: none"> <li>Directional fencing should be installed near high-use crossing points.</li> <li>Riparian restoration to enhance creekbanks may support movement during flooding events when dry bank area is reduced.</li> </ul>	<ul style="list-style-type: none"> <li>Bobcat</li> <li>Coyote</li> <li>Deer</li> <li>Gray fox</li> <li>Mountain lion</li> </ul>
Analysis of the Upper Pajaro Valley for maintaining wildlife movement (Gray 2016)	Local-scale study in the Upper Pajaro Valley	This study collected camera trap data from 19 sites in the Upper Pajaro Valley. Detection data were modeled with environmental variables to characterize habitat use. Monitoring results were compared to the Coyote	<p>Based on camera monitoring data, from 2012-2013, the following aspects of habitat use in the <b>Pajaro River</b> area were identified:</p> <ul style="list-style-type: none"> <li>Llagas Creek had the highest detection rate for native species which, as a group, showed a preference for increased canopy cover and low water runoff;</li> <li>Mountain lion detections only occurred in areas far from roadways, with high canopy cover;</li> </ul>	<p>Additional research should seek to evaluate the following:</p> <ul style="list-style-type: none"> <li>Differences in habitat features between sites with highly dissimilar detection rates (e.g., Llagas Creek and the San Ysidro Creek Bridge); and</li> <li>Species-specific responses to land use and built structures.</li> </ul>	<ul style="list-style-type: none"> <li>Bobcat</li> <li>Coyote</li> <li>Deer</li> <li>Gray fox</li> <li>Mountain lion</li> </ul>

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		Valley Linkage Assessment Study by Pathways for Wildlife (Diamond and Snyder 2016).	<ul style="list-style-type: none"> <li>Response to crossing structures (culverts and bridges) differed by species, with mesocarnivores showing a preference for structures and deer demonstrating avoidance; and</li> <li>Habitat characteristics and species-specific responses differed from <b>Coyote Valley</b>, but detection rates were similar between the areas.</li> </ul>		
Enhancing ecological connectivity and safe passage for wildlife on highways between the southern Santa Cruz Mountains, Gabilan Range, and Diablo Range (Diamond et al. 2022)	Regional analysis with a focus on the Aromas Hills and the Upper Pajaro Valley	This assessment used camera monitoring, roadkill surveys, and least cost path models for a suite of focal species to evaluate wildlife movement across SR 129, Hwy 101, and SR 156. Monitoring sites were rated and prioritized for connectivity importance based on regional and local connectivity value and adjacent land-use and protection.	<p>This study identified 19 priority connectivity sites in Upper Pajaro Valley. Heavily used crossing sites were all characterized by having high-quality habitat on both sides of the linkage. Of the priority sties, the following 2 were considered an urgent priority for protection:</p> <ul style="list-style-type: none"> <li>Tar Creek overpass: Connects Sargent Hills with the Upper Pajaro Valley and was considered critical for protection due to proposed conversion of habitat west of Hwy 101 to a rock and gravel quarry; and</li> <li>San Benito River Bridge: This underpass of Hwy 101 was heavily used by native species and is at risk of conversion from the proposed Betabel Road development.</li> </ul>	<ul style="list-style-type: none"> <li>Land-use security should be prioritized to ensure protection of existing habitat and crossing points through the Upper Pajaro Valley.</li> <li>The usability of existing crossings can be improved through regular monitoring and maintenance, including debris and vegetation removal and installation of directional fencing to prevent animals crossing highways.</li> </ul>	<ul style="list-style-type: none"> <li>Badger</li> <li>Black-tailed deer</li> <li>Bobcat</li> <li>Mountain lion</li> <li>Mesocarnivores</li> </ul>
Wildlife Permeability and Hazards across Highway 152 Pacheco Pass (Pathways for Wildlife 2020a)	Local-scale study in Pacheco Pass	This study, commissioned by the Habitat Agency, used bi-weekly roadkill surveys and camera monitoring over the course of 12 months to characterize the use of existing crossing infrastructure and recommend enhancements. The analysis also incorporated vehicle-strike data on tule elk from Cristen Langer of CDFW.	<p>Wildlife movement consistently detected at all studied crossing structures, except when flood. The study revealed the following aspects of movement through Pacheco Pass:</p> <ul style="list-style-type: none"> <li>Passage for small and large mammals was most common under Pacheco Creek Bridge;</li> <li>Roadkill detections nearby crossing structures were higher during periods of structure flooding; and</li> <li>Vehicle-strike mortalities occurred for three special-status species: American badger, tule elk, and mountain lion.</li> </ul>	<ul style="list-style-type: none"> <li>Install directional fencing to direct animals to crossing structures.</li> <li>Conditions at existing culverts can be improved by modifying riprap to be navigable by deer and other species during flooding.</li> <li>Enhance creekbanks by removing invasive vegetation and restoring native vegetation.</li> <li>Install wildlife shelving units to allow passage during flooding.</li> </ul>	<ul style="list-style-type: none"> <li>Deer</li> <li>Coyote</li> <li>Bobcat</li> <li>Mountain lion</li> <li>Tule elk</li> <li>Gray fox</li> <li>Badger</li> <li>Raccoon</li> <li>Skunk</li> <li>Small animals such as amphibians, snakes, and birds</li> </ul>

Table 4: Summary of existing plans, reports, and studies addressing connectivity in the Plan Area and focal areas					
Study	Geographic Area	Approach	Findings	Recommendations	Species Addressed
SR-152 Pacheco Pass Permeability & Pacheco Creek Wildlife Connectivity Study: Mountain lion Report (Pathways for Wildlife 2020b)	Local-scale study in Pacheco Pass	This study used the same camera monitoring approach as above, with a focus on mountain lion detection.	Camera monitoring between August 2018 and May 2020 revealed the following about mountain lion in Pacheco Pass: <ul style="list-style-type: none"> <li>• Detections were all within the Pacheco Creek Reserve area; and</li> <li>• Vehicle strike records occurred at Elephant Head Creek Bridge and east of the Cedar Creek Bridge</li> </ul>	This study did not make new recommendations and instead refers to those made in the previous report, Wildlife Permeability and Hazards across Highway 152 Pacheco Pass (Pathways for Wildlife 2020a).	Mountain lion
SR-152 Pacheco Pass Regional Wildlife Connectivity Study 2021-2022(Pathways for Wildlife 2023)	Local-scale study in Pacheco Pass	This study used the same camera monitoring and roadkill survey approach as Pathways for Wildlife (2020) above and included 29 monitoring sites (6 bridges and 23 culverts) from San Felipe Lake to San Luis Reservoir in June 2021-June 2022.	This 12-month study identified a high rate of passage of medium to large mammals in the study area. Specifically, camera trapping and roadkill data indicated the following: <ul style="list-style-type: none"> <li>• Barbed wire or other restrictive fencing is present on one or both sides of many culverts and bridges which may impede movement;</li> <li>• Only five sites regularly facilitated deer passage, including Cedar Creek Bridge which consistently supported native species passage;</li> <li>• Passage rates at many sites declined during heavy rains which lead to flooding and sediment build-up in culverts; and</li> <li>• The majority of roadkill observations were between San Felipe Lake and Cedar Creek but locations varied with respect to adjacent habitat and type of highway median.</li> </ul>	In addition to the recommendations made in the previous report (Pathways for Wildlife 2020a) this study identified the following to improve connectivity: <ul style="list-style-type: none"> <li>• Create a new dedicated overpass or underpass for large mammals (e.g., mountain lion and tule elk);</li> <li>• Manage cattle operations to exclude cows from bridge undercrossings and adjacent habitat and install fencing compatible with wildlife movement;</li> <li>• Install directional fencing between bridges which facilitate movement by deer and other large mammals; and</li> <li>• Retrofit culverts that experience flooding to include elevated walkways.</li> </ul>	This study detected the same species as Pathways for Wildlife 2020a, in addition to wild pig ( <i>Sus scrofa</i> ).

## 4 Connectivity Recommendations

This section summarizes the opportunities, constraints, and recommended strategies to enhance connectivity in each of the three focal areas and the broader region, based on a review and synthesis of the information from Section 3. For each area, recommendations are presented for four general categories of actions to promote connectivity (Box 5). The key connectivity assessments, recommendations, and opportunities and constraints for enhancements in the Plan Area and each focal area are summarized in Table 5.

### 4.1 Coyote Valley

The Coyote Valley focal area, which includes Linkages 6, 8, and 10 in the Habitat Plan (Appendix A; ICF 2012), has been identified in several statewide and regional plans as a critical region for efforts to enhance habitat connectivity between the Santa Cruz Mountains and the Diablo Range (Section 3.3; Penrod et al. 2013, ICF 2017). The current master planning process for Coyote Valley may provide opportunities for collaborative connectivity planning in this area (SCVOSA 2021).

Detailed recommendations for projects to promote connectivity through Coyote Valley are provided in two recent plans:

1. *The Coyote Valley Landscape Linkage* (Open Space Authority and Conservation Biology Institute 2017); and
2. *Recommendations to Reduce Wildlife-Vehicle Collisions on the Monterey Road Corridor* (2019) from the Santa Clara County Wildlife Corridor Technical Working Group, Coyote Valley Subcommittee (hereafter, Wildlife Corridor Technical Working Group).

The following sections summarize key recommendations for habitat protection, restoration, and transportation infrastructure improvements in those plans, as well as additional recommendations developed since their publication.

To maximize the benefits of connectivity work in the area, projects should be developed in coordination with the conservation and transportation agencies and organizations working in the region, which include the Open Space Authority, POST, Caltrans, California High-Speed Rail Authority, and Valley Transportation Authority.

#### Box 5: General Habitat Connectivity Strategies

**Protect Habitat:** safeguard linkages, corridors, and other areas of intact habitat, enable restoration and enhancement, transportation infrastructure improvements, and studies.

**Restore or Enhance Connectivity:** Conduct habitat restoration, enhancement, and habitat management to increase the permeability of habitat

**Transportation Infrastructure Improvements:** Enhance existing infrastructure such as (e.g., culverts and bridges) to facilitate safe passage, through retrofits, maintenance, and installation of fences to promote animal use, and install new crossing structures.

**Future Studies and Plans:** Conduct additional studies to fill data gaps and evaluate feasibility of projects, and to develop plans for implementation of linkage designs.

Table 5: Connectivity Assessment and Recommendations Summary. Details including references are provided in the text, tables, and figures referenced.				
Key Considerations	Overall Plan Area (Figure 1)	Coyote Valley (Figure 2)	Pajaro River (Figure 3)	Pacheco Pass (Figure 4)
<b>BACKGROUND INFORMATION</b>				
Key Connectivity Studies and Plans	<ul style="list-style-type: none"> <li>Bay Area Critical Linkages (Penrod et al. 2013)</li> <li>Santa Clara County Regional Conservation Investment Strategy (ICF 2017)</li> </ul>	<ul style="list-style-type: none"> <li>Coyote Valley Linkage Plan (SCVOSA and CBI 2017)</li> <li>Coyote Valley Bobcat and Gray Fox Study (Pathways for Wildlife 2019)</li> <li>Coyote Valley Bobcat Habitat Preference and Connectivity Study (Serieys and Wilmers 2019)</li> <li>Monterey Road Wildlife Crossing Recommendations (Coyote Valley Subcommittee, Santa Clara County Wildlife Corridor Technical Working Group 2019)</li> <li>Reptile and Amphibian Linkage Study (HT Harvey 2020)</li> </ul>	<ul style="list-style-type: none"> <li><i>Analysis of the Upper Pajaro Valley for maintaining wildlife movement</i> (Gray 2016)</li> <li><i>The Nature Conservancy’s Pajaro Study</i> (Diamond and Snyder 2013)</li> <li><i>The Pajaro Compass</i> (Pajaro Compass 2016)</li> <li>Southern Santa Cruz Mountains Wildlife Connectivity Study (Diamond et al. 2022)</li> <li>Upper Pajaro River Floodplain Assessment (The Nature Conservancy 2004).</li> </ul>	<ul style="list-style-type: none"> <li>Wildlife Permeability Study across Highway 152 (Pathways for Wildlife 2020a)</li> <li>SR-152 Pacheco Pass Regional Wildlife Connectivity Study (Pathways for Wildlife 2023)</li> </ul>
Habitat Plan Conservation Strategy Elements (Appendix A)	<ul style="list-style-type: none"> <li>20 Linkage Areas</li> <li>Thirty-four Conservation Analysis Zones including 13 featuring Moderate and High Conservation Effort</li> </ul>	<ul style="list-style-type: none"> <li>Linkages 2, 6, 7, and 8</li> <li>One High Effort Conservation Analysis Zones: Coyote-5</li> <li>Two Moderate Effort Conservation Analysis Zones: Guadalupe-1 and Coyote-4</li> </ul>	<ul style="list-style-type: none"> <li>Linkages 11, 12, 14, 18, 19, and 20</li> <li>One High Effort Conservation Analysis Zones: Uvas-5</li> <li>Two Moderate Effort Conservation Analysis Zones: Pacheco-8, Pescadero-1</li> </ul>	<ul style="list-style-type: none"> <li>Linkages 14, 15, and 17</li> <li>Three Moderate Effort Conservation Analysis Zones: Pachecho-4, 8, and 6</li> </ul>
Conservation Agencies and Organizations	<ul style="list-style-type: none"> <li>California Department of Fish and Wildlife</li> <li>California State Parks</li> <li>Peninsula Open Space Trust</li> <li>Santa Clara County Parks</li> <li>Santa Clara Valley Open Space Authority</li> <li>Silicon Valley Land Conservancy</li> </ul>	<ul style="list-style-type: none"> <li>City of San José</li> <li>Guadalupe-Coyote Resource Conservation District</li> <li>Peninsula Open Space Trust</li> <li>Santa Clara County Parks</li> <li>Santa Clara Valley Open Space Authority</li> </ul>	<ul style="list-style-type: none"> <li>Loma Prieta Resource Conservation District</li> <li>Santa Clara Valley Open Space Authority</li> <li>Silicon Valley Land Conservancy</li> <li>Peninsula Open Space Trust</li> </ul>	<ul style="list-style-type: none"> <li>Loma Prieta Resource Conservation District</li> <li>California Department of Fish and Wildlife</li> <li>California State Parks</li> </ul>

<b>Table 5: Connectivity Assessment and Recommendations Summary. Details including references are provided in the text, tables, and figures referenced.</b>				
<b>Key Considerations</b>	<b>Overall Plan Area (Figure 1)</b>	<b>Coyote Valley (Figure 2)</b>	<b>Pajaro River (Figure 3)</b>	<b>Pacheco Pass (Figure 4)</b>
Infrastructure Agencies	<ul style="list-style-type: none"> <li>• Caltrans</li> <li>• California High-Speed Rail Authority</li> <li>• Pajaro Valley Flood Prevention Authority</li> <li>• Santa Clara Valley Water District</li> <li>• Valley Transportation Authority</li> </ul>	<ul style="list-style-type: none"> <li>• Caltrans</li> <li>• California High-Speed Rail Authority</li> <li>• Valley Transportation Authority</li> </ul>	<ul style="list-style-type: none"> <li>• Caltrans</li> <li>• California High-Speed Rail Authority</li> <li>• Valley Transportation Authority</li> <li>• Pajaro Valley Flood Prevention Authority</li> </ul>	<ul style="list-style-type: none"> <li>• Caltrans</li> <li>• California High-Speed Rail Authority</li> <li>• Santa Clara Valley Water District</li> </ul>
<b>General Land Use</b>				
Current Land Use	<p>Urban and residential development occurs patchily within valleys (Santa Clara and Upper Pajaro) which otherwise feature extensive working lands (mostly orchards and row crops).</p> <p>The adjacent Santa Cruz Mountains and Diablo Range feature extensive intact habitat (e.g., grasslands oak woodlands) used primarily for cattle grazing) and protected open space (e.g., parks and open space preserves).</p>	<p>The valley itself is predominantly used for agricultural and rural residential development, though there are pockets of denser residential development in the south and some commercial and industrial development (e.g., Metcalf Energy Center) scattered throughout. Agricultural uses include hay production, row crops, and orchards.</p> <p>The foothills on either side of the valley largely feature intact habitat (grassland, coastal scrub, and oak woodland) that primarily feature private ranchlands and protected parks and open space preserves.</p>	<p>The Pajaro River corridor is very narrow and features agricultural land (primarily row crops) immediately adjacent to the stream banks which have been channelized in places. Rural residential development and some commercial development occur primarily along the transportation corridors (SR 25, SR 152, and Highway 101).</p> <p>The Diablo Range and Santa Cruz Mountains foothills feature primarily private land used for cattle grazing</p>	<p>Pacheco Pass features primarily intact habitat including grassland and oak woodland. Much of the land is privately held and used for cattle grazing though the region features two large state parks (Henry W. Coe State Park and Pacheco State Park) and the Cañada de los Osos Ecological Reserve as well as large private easement lands in the northeast.</p>
Planned Land Use Changes	<p>Development pressure is anticipated to continue to result in the following in residential, commercial, and industrial development along major roads, with the foothills subject to rural residential (e.g., “ranchettes”).</p>	<p>Until 2021, the valley was envisioned to be used for industrial and other more intensified land use, though the northern valley was rezoned for Agriculture and the Urban Reserve designation was removed in 2021. Despite this, the proximity of land to urban development creates high pressure for intensified land uses (i.e., residential, commercial, and industrial development). The Coyote Valley Corridor Study, from the City Council</p>	<p>Potential and planned land use changes in the Pajaro River area include the following:</p> <ul style="list-style-type: none"> <li>• Commercial development along Highway 101 (e.g., Betabel commercial node);</li> <li>• More intensive agricultural practices in the valley floor;</li> <li>• A proposed autonomous vehicle testing site south of SR 25, adjacent to the Pajaro River; and</li> </ul>	<p>The Pacheco Reservoir Expansion Project would modify land use through construction of a new dam and expansion of the current reservoir on North Fork Pacheco Creek (Santa Clara Valley Water District 2021).</p>

<b>Table 5: Connectivity Assessment and Recommendations Summary. Details including references are provided in the text, tables, and figures referenced.</b>				
<b>Key Considerations</b>	<b>Overall Plan Area (Figure 1)</b>	<b>Coyote Valley (Figure 2)</b>	<b>Pajaro River (Figure 3)</b>	<b>Pacheco Pass (Figure 4)</b>
		of San José, is evaluating current and potential land uses east of Monterey Road to inform future development and design standards in that area (Placeworks 2024).	<ul style="list-style-type: none"> <li>A proposed sand and gravel mine west of Highway 101, near Tar Creek.</li> </ul>	
Land Ownership Patterns	Predominantly private land with large public and protected lands interspersed through the valley. The foothills feature extensive protected lands and remaining large blocks of private land.	Land is largely privately owned in Coyote Valley. Multiple county parks and open space preserves occur in the foothills and the north and mid-valley.	Land is largely privately owned in the Upper Pajaro Valley, though there are several large, primarily agricultural preserves along the Pajaro River and around Soap Lake.	The region primarily features large, privately owned ranches, many of which abut existing protected lands including parks and easements.
<b>Transportation Corridors</b>				
Current Wildlife Barriers	The Plan Area features numerous highways, interstates, and other major roads that fragment habitat and create barriers to wildlife movement; in the connectivity focal areas, these include Highway 101, SR 152, and major roads such as Monterey Road and Santa Teresa Boulevard.	Highway 101, Monterey Road, Santa Teresa Boulevard, and several smaller rural roadways impede movement through Coyote Valley.	Highway 101, SR 25, and SR 152 cross through the Upper Pajaro Valley, affecting connectivity.	State Route 152 traverses the Pacheco Creek corridor through the focal area.
Planned Transportation Projects	High-Speed Rail is planned to cross the Plan Area from San Jose, through Gilroy, across the Upper Pajaro Valley, and through Pacheco Pass.	The high-Speed Rail alignment would be at-grade, with exclusion fencing and crossing deterrents, aligning with the current Union Pacific Railway. Project designs include creating multiple dedicated wildlife crossings and jump-outs in Coyote Valley.	<ul style="list-style-type: none"> <li>High-Speed Rail alignment on viaduct (aerial) with noise and visual barriers;</li> <li>The Highway 101 Improvement Project would widen the highway from Gilroy to Hwy 129 in San Benito County;</li> <li>Phase 1 of the Highway 101 project, would reconstruct and widen the interchange with SR 25 (Valley Transportation Agency 2022);</li> <li>The SR 25 Widening Project which would expand the two-lane highway west of Highway 101 to 4 lanes; and</li> </ul>	<ul style="list-style-type: none"> <li>High-speed Rail alignment would traverse Pacheco Pass through aerial alignment and through a tunnel.</li> <li>The SR 152 New Trade Corridor project would widen the highway to four lanes between San Felipe and the SR 156 interchange.</li> </ul>

Table 5: Connectivity Assessment and Recommendations Summary. Details including references are provided in the text, tables, and figures referenced.				
Key Considerations	Overall Plan Area (Figure 1)	Coyote Valley (Figure 2)	Pajaro River (Figure 3)	Pacheco Pass (Figure 4)
			<ul style="list-style-type: none"> <li>The SR 152 New Trade Corridor project would create a new 4-lane highway segment from US 101 to SR 156 and may include realignment of a portion of SR 25 (Valley Transportation Authority 2020).</li> </ul>	
KEY RECOMMENDATIONS				
Habitat Protection	<ul style="list-style-type: none"> <li>Protect habitat that is most critical for maintaining habitat connectivity through multiple linkages.</li> <li>Prioritize habitat in ‘choke points’ (tenuous areas) including the three focal areas, where future modifications threaten to sever connectivity.</li> <li>Protect linkages that are wide and enable species to move through them over time (e.g., multiple generations)</li> <li>Protect riparian and riparian which provides pathways for wildlife movement and are essential in agricultural and developed areas.</li> <li>Create upland habitat protections to maintain large areas of intact habitat that can support special-status species and sensitive natural communities.</li> </ul>	<p>Protect habitat across the valley floor to connect protected lands within the foothills (Section 4.1.1):</p> <ul style="list-style-type: none"> <li>Prioritize land in the northern portion of the valley, where the linkage is narrow and parcels are larger and generally less modified;</li> <li>Protect relatively intact habitat in the western foothills (SCVOSA and CBI 2017);</li> <li>Prioritize protection of less developed properties east of Monterey Road to buffer habitat at Coyote Creek Parkway; and</li> <li>Acquire land adjacent to transportation corridors to facilitate crossing structure improvements needed to facilitate safe passage through Monterey Road and Highway 101.</li> </ul>	<p>Protection of land in the foothills and along the Pajaro River corridor through the valley will enable habitat restoration, enhancement, and transportation improvements to promote connectivity through this linkage. Priorities for habitat protection include (Section 4.2.1):</p> <ul style="list-style-type: none"> <li>Protect upland habitat with high pond density in the southern tip of the Santa Cruz Mountains adjacent to Highway 101 (zone Pescadero-3), and grasslands north of Soap Lake that adjoin the Diablo Range (Pacheco-8), where animals can move into and out of the corridor through the valley floor;</li> <li>Protect agricultural land on the valley floor, with an emphasis on that featuring by riparian habitat and low-intensity cultivated land; and</li> <li>Protect land adjacent to key transportation infrastructure areas that provide or could provide safe passage (e.g., Highway 101 near Betabel).</li> </ul>	<p>Relatively intact habitat and consolidated land ownership create substantial opportunity to protect habitat, including in conservation analysis zones Pacheco-1, 2, 3, 4, 5, and 6 (Appendix A), and to connect existing protected areas (Section 4.3.1).</p> <ul style="list-style-type: none"> <li>Prioritize riparian protection along Pacheco Creek and connecting streams to maintain the existing movement corridor.</li> <li>Targeted upland habitat protections may connect existing protected areas and enable grassland habitat enhancement for San Joaquin kit fox and American badger.</li> <li>Protection of habitat near concentrated roadkill areas would increase the feasibility of conducting transportation infrastructure improvement projects, including installing directional fencing.</li> </ul>

Table 5: Connectivity Assessment and Recommendations Summary. Details including references are provided in the text, tables, and figures referenced.				
Key Considerations	Overall Plan Area (Figure 1)	Coyote Valley (Figure 2)	Pajaro River (Figure 3)	Pacheco Pass (Figure 4)
Habitat Restoration and Enhancement	<ul style="list-style-type: none"> <li>Enhance riparian corridors with vegetation buffers; and</li> <li>Remove or replace barriers around intact habitat such as barbed wire fencing and other livestock exclusion</li> </ul>	<p>Restore habitat to expand and connect habitat for diverse assemblages of native species (<b>Table 6</b>; Section 4.1.2):</p> <ul style="list-style-type: none"> <li>Fisher Creek: Restore and realign the creek to the low-lying western area of the valley to support expansion of a riparian corridor and adjacent wetland habitat (ESA 2021);</li> <li>Laguna Seca: Restore Laguna Seca to enhance habitat for aquatic species while providing upland habitat features to facilitate movement by terrestrial species (SCVOSA and CBIA 2017);</li> <li>North Coyote Valley Conservation Area (Tulare Meadows): Restore remnant oak savanna to provide habitat and cover for wildlife passage;</li> <li>Improve upland habitat by converting agricultural fields to grassland (grazing land) to promote California tiger salamander (HT Harvey 2020); and</li> <li>Restore habitat adjacent to existing and new transportation infrastructure improvements (e.g., Bailey Avenue, Santa Teresa Blvd).</li> </ul>	<p>Increase permeability of habitat on the valley floor and promote habitat conditions in adjacent uplands (Section 4.2.2):</p> <ul style="list-style-type: none"> <li>Expand the width and areal extent of riparian habitat along the Pajaro River and associated drainages to facilitate its use by aquatic and terrestrial species not only as a movement corridor but as a broad linkage that can sustain movement of species through multiple generations; and</li> <li>Establish collaborative management agreements with landowners to maintain or create habitat.</li> </ul>	<p>Habitat in this region is generally intact though could benefit from the following (Section 4.3.2):</p> <ul style="list-style-type: none"> <li>Riparian restoration in Pacheco Creek to facilitate use of the riparian corridor including during high-flow periods; and</li> <li>Well-managed cattle grazing to enhance upland habitat.</li> </ul>
Transportation Infrastructure Improvements	<ul style="list-style-type: none"> <li>Regularly monitor and maintain existing culverts clear of debris and dense vegetation build-up;</li> <li>Remove or replace gates and exclusionary fencing at culverts and bridges; and</li> <li>Identify opportunities to partner with HSR to design new crossing</li> </ul>	<p>Create and maintain usable, dedicated wildlife crossing structures across major roadways (<b>Table 7</b>; Section 4.1.1):</p> <ul style="list-style-type: none"> <li>Install directional fencing on both Monterey Road and Highway 101;</li> </ul>	<p>Existing crossing structures under the primary roadways (Highway 101, SR 25, and SR 152) are largely functional though could be improved by (Section 4.2.3):</p> <ul style="list-style-type: none"> <li>Regular monitoring to identify maintenance needs;</li> <li>Managing vegetation and sediment build-up at current high-use crossings;</li> </ul>	<p>Existing infrastructure is being used by small and large mammals, but improvements can reduce roadkill (Section 4.3.3):</p> <ul style="list-style-type: none"> <li>In the short-term, directional fencing can guide animals towards existing crossing structures;</li> </ul>

Table 5: Connectivity Assessment and Recommendations Summary. Details including references are provided in the text, tables, and figures referenced.				
Key Considerations	Overall Plan Area (Figure 1)	Coyote Valley (Figure 2)	Pajaro River (Figure 3)	Pacheco Pass (Figure 4)
	structures at priority locations, appropriate for focal species in each area.	<ul style="list-style-type: none"> <li>On Monterey Road, create additional gaps in the concrete median and eventually replace with a wildlife-friendly design;</li> <li>On Highway 101 and at Fisher Creek Bridge at Bailey Avenue, remove debris and vegetation blocking culverts, relocate livestock fencing away from entrances;</li> <li>Consider retrofitting or replacement of Highway 101 culverts to support long-term use;</li> <li>Evaluate feasibility of installing one or more culverts for Santa Teresa Blvd that can facilitate wildlife passage;</li> <li>At Fisher Creek, fill voids in the riprap for the culvert until the structure can be retrofitted; and</li> <li>Identify a new crossing infrastructure location for Monterey Road, potentially near Bailey Overpass or Metcalf Bridge.</li> </ul>	<ul style="list-style-type: none"> <li>Installing directional fencing for Tick Creek culvert and Tar Creek overpass on Highway 101, and the culverts on SR 152; and</li> <li>Potentially redesigning or creating new crossing structures for SR 152 near roadkill hotspots.</li> </ul> <p>Planned transportation improvement projects (Highway 101, SR 25, and HSR) may constrain future movement though present potential opportunities to conduct infrastructure enhancements.</p>	<ul style="list-style-type: none"> <li>Maintenance of right-of-way fencing and clearing sediment from culverts following storm events can improve safe passages;</li> <li>Modification of riprap and drainage at undercrossings can enhance function during peak flow of Pacheco Creek; and</li> <li>Creation of an overcrossing, or land bridge, would facilitate movement over SR 152 by multiple species groups.</li> </ul>
Future Studies/Plans	Assess potential recreational and open space plans to identify opportunities to enhance connectivity and monitor zoning and development planning to prevent additional fragmentation of the landscape.	<p>Though extensively evaluated, the focal area could be further studied to (Section 0):</p> <ul style="list-style-type: none"> <li>Evaluate herpetofauna in Fisher Creek, Coyote Creek, and Laguna Seca and associated drainages;</li> <li>Assess the feasibility of converting existing cropland to grazing lands to enhance permeability; and</li> <li>Monitor wildlife movement through riparian areas during high-flow periods.</li> </ul>	<p>The following studies and plans are recommended (Section 4.2.4):</p> <ul style="list-style-type: none"> <li>Further evaluate wildlife usage of working lands to inform protection and management;</li> <li>Assess and compile land use data at a scale appropriate for connectivity modeling; and</li> <li>Identify habitat to protect and enhance in focused linkage plan that can prevent further development in the floodplain and help maintain compatible working lands.</li> </ul>	<p>The feasibility of enhancing existing culverts should be investigated to improve drainage and create ramps over drop-offs at downstream openings.</p>

#### 4.1.1 Habitat Protection

While scattered development on the valley floor presents challenges to habitat protection in some respects, the northern portion of the Coyote Valley features relatively large, less intensively developed parcels that are both more permeable to wildlife (Diamond and Snyder 2016) and more feasible to protect. North Coyote Valley is also within the sphere of influence of the City of San José, which included in its General Plan actions and policies to enhance transportation infrastructure permeability and, in 2021, the General Plan was amended changing land-use designation in northern Coyote Valley from Industrial to Agricultural and Open Space (Section 2.2.1; City of San José 2011).

The Open Space Authority and POST have been actively working with partners in the region including the Habitat Agency and City of San José, among others, to protect and restore key habitat on the valley floor as well as in the adjoining foothills. Over the past two decades, the organizations have protected the Coyote Valley Open Space Preserve (OSP), Tilton Ranch, and the Tilton-Baird properties, on the west side of the valley, Coyote Ridge OSP on the eastern foothills, and the North and Mid-Coyote Valley Conservation Areas, which consist of seven properties located near Fisher Creek in the northern portion of the valley floor (**Figure 2**). This area is adjacent to Tulare Hill, an existing protected area which provides habitat for multiple species, including the Bay checkerspot butterfly and California red-legged frog.

The following areas can build upon these existing land protections to improve connectivity in the Coyote Valley focal area by connecting existing protected habitat on either side of the valley (Wildlife Corridor Technical Working Group 2017; Serieys and Wilmers 2019; HT Harvey 2020):

1. **Highway 101 Corridor:** Acquiring land adjacent to Highway 101 can enable access to existing transportation infrastructure that serves as wildlife crossing structures. Multiple culverts open to habitat on private lands east of Coyote Creek Parkway including: 1) the segment of Highway 101 adjacent to the Coyote Creek Golf Club, which features several culverts, and 2) the section north of Field Sports County Park, along Malech Road. Protection of these high conservation effort areas (conservation analysis zone Coyote-5; Appendix A; ICF 2012 in the Habitat Plan (ICF 2012), can facilitate enhancement of the culverts as well as the surrounding habitat.
2. **Monterey Road Corridor:** Protection of habitat along the Monterey Road corridor can similarly enable new crossing structure and habitat improvements, and habitat from Tulare Hill to Palm Avenue is a specific priority for land protection (POST 2021). Although relatively small-footprint development occurs along Monterey Road, less developed properties on the east side of Monterey Road adjacent to Coyote Creek Parkway present an opportunity to protect the valley floor from additional development (Placeworks 2024), as well as buffering habitat at Coyote Creek Parkway and facilitating enhancements to transportation crossing infrastructure (**Figure 2**).
3. **Fisher Creek Corridor and Adjacent Land:** As demonstrated by camera trap monitoring and bobcat telemetry data, Fisher Creek is an essential movement corridor through the valley (Diamond and Snyder 2016; Serieys and Wilmers 2019). The North and Mid-Coyote Valley Conservation Areas currently encompass a large segment of the Fisher Creek corridor. Additional protections should be prioritized adjacent to these properties, with the goal of connecting to larger protected areas of Calero County Park and Coyote Valley Open Space Preserve (Diamond and Snyder 2016; SCVOSA and CBI 2017). Privately owned land in the western foothills, northeast of the Cinnabar Hills Golf Club near Kalana Avenue, would facilitate this connection, and also connect Coyote Valley Open Space Preserve to Calero County Park.

This moderate to high conservation effort in the Habitat Plan (conservation analysis zones Guadalupe-1 and Coyote-5; Appendix A) includes pond habitat, oak woodland, and serpentine grassland that could potentially support Bay checkerspot butterfly (ICF 2012).

4. **Santa Teresa County Park to Calero County Park:** This area features extensive annual grasslands and oak woodlands, and has a high probability of use by mountain lion (Wilmers et al. 2013). Additionally, both county parks may support breeding and dispersal of California red-legged frogs and California tiger salamander (HT Harvey 2020).

Parcels southwest of the IBM campus property and directly north of Calero Reservoir, are moderately sized (40-200 acres) and privately owned. The current parcel configuration would necessitate multiple acquisitions or management agreements to create a contiguous, north-to-south corridor between the county parks (**Figure 2**). Alternatively, protection of the undeveloped hills of the IBM property (>900 acres), which feature two potential amphibian breeding ponds and documented bobcat presence, would connect both county parks with the North Coyote Valley Conservation Area (Serieys and Wilmers 2019; HT Harvey 2020).

#### 4.1.2 Habitat Restoration and Enhancement

Habitat restoration can promote connectivity through the Coyote Valley by expanding the area of intact habitat preferentially used by diverse assemblages of native species. In the northern portion of the valley, efforts to restore the Fisher Creek floodplains, riparian habitat, and the Laguna Seca wetland complex are being developed by the Open Space Authority, in collaboration with POST, the City of San Jose, and Valley Water (ESA 2021). In 2018, Valley Water also initiated restoration of habitat south of Coyote Creek Golf Drive, including removal of invasive species and planting of valley oak (Calnan and Lockwood 2023). Additional opportunities to restore native grassland habitat and enhance ecological function of low-intensity agricultural fields can enhance connectivity and create habitat for nesting birds and covered amphibian species (ICF2012; ICF 2017; HT Harvey 2020). The habitat restoration and enhancement strategies recommended for Coyote Valley are summarized in **Table 6**.

##### 4.1.1 Transportation Infrastructure

Connectivity through the Coyote Valley focal area can be enhanced by creating and maintaining usable, dedicated wildlife crossing structures across major roadways. Existing culverts and underpasses facilitate movement across Highway 101 for some species; however, wildlife-vehicle collisions occur frequently on Monterey Road and Highway 101 (Pathways for Wildlife 2019; Diamond and Sandoval 2023).

**Table 7** identifies recommended connectivity enhancement strategies, challenges, and development considerations related to transportation infrastructure for Coyote Valley. Along Highway 101, strategies primarily focus on improvements to existing bridges and culverts; meanwhile, recommendations for other roadways, including Monterey Road, Santa Teresa Boulevard, and Bailey Avenue, emphasize creation of dedicated crossing structures. Monterey Road is a primary barrier to movement across Coyote Valley and transportation improvements should focus on creating and enhancing safe crossing points which connect to existing open space and protected lands (SCVOSA and CBI 2017; Pathways for Wildlife 2019; HT Harvey 2020).

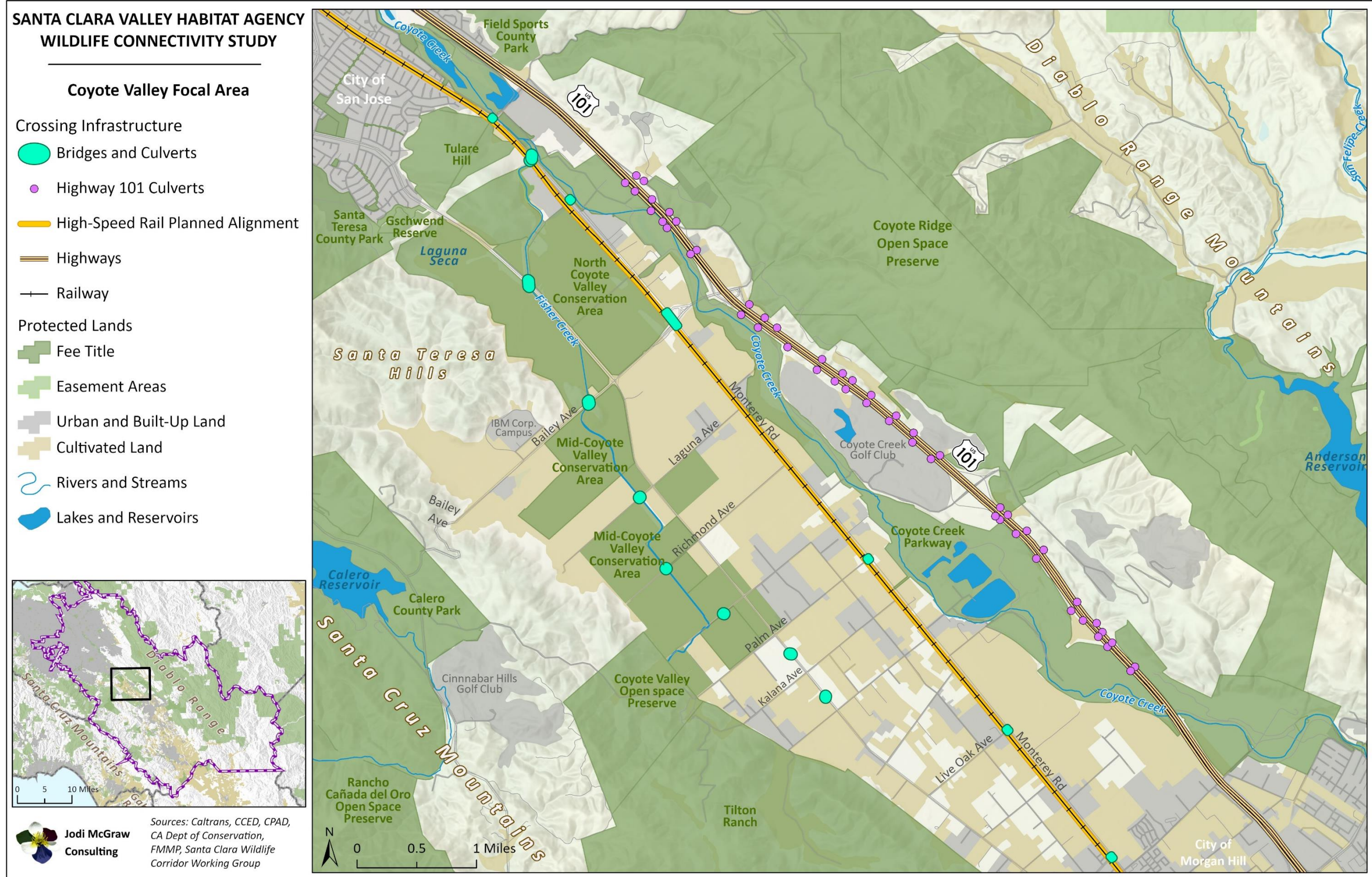


Figure 2: Coyote Valley Focal Area

**Table 6: Habitat restoration and enhancement recommendations for Coyote Valley**

Area or Feature	Recommendation
Coyote Creek	<ul style="list-style-type: none"> <li>• <b>Evaluate Exotic Animal Eradication:</b> Downstream of Anderson Dam (<b>Figure 2</b>), the existing riparian vegetation and connected upland habitat of Coyote Creek support terrestrial species movement (Phillips et al. 2012); however, exotic and invasive species including non-native fish and American bullfrogs (<i>Lithobates catesbeianus</i>) may be preventing native aquatic species, such as California red-legged frog, from breeding in the creek (HT Harvey 2020). Additional study would be required to address the feasibility of managing or removing these non-native species.</li> <li>• <b>Replace Fence near Coyote Creek Parkway:</b> South of the Coyote Creek Golf Drive underpass at Highway 101, chain-link fencing between the highway and Coyote Creek Parkway may restrict movement for larger species (Figure 2). The section of fence south of the underpass should be replaced with wildlife-friendly fencing (Diamond and Snyder 2016).</li> </ul>
Fisher Creek	<ul style="list-style-type: none"> <li>• <b>Restore Riparian Communities:</b> Restoring the riparian habitat with fast-growing native shrubs and native trees would provide additional plant cover that can promote movement through the landscape by species that require cover, such as bobcat (Serieys and Wilmers 2019). At road crossings, including Santa Teresa Road, Bailey Road, Laguna Drive, and Palm Avenue (<b>Figure 2</b>), expanding and enhancing riparian habitat would provide cover during high-flow periods when the area that wildlife can traverse is reduced (Diamond and Snyder 2016).</li> <li>• <b>Enhance Stream Habitat:</b> Large-scale restoration of the creek flow as well as expansion of surrounding riparian vegetation, with 300 ft buffers on either side, and improvements to upland habitat would significantly enhance the corridor’s connectivity function for terrestrial and aquatic species (HT Harvey 2020; ESA 2021).</li> <li>• <b>Enhance the Floodplain:</b> The North Coyote Valley Conservation Area (Figure 2) includes a large reach of Fisher Creek, and floodplain restoration is being included in the Open Space Authority’s Coyote Valley Master Planning process (Santa Clara Valley Open Space Authority 2021). Restoration opportunities for Fisher Creek, suggested in the Open Space Authority’s Coyote Valley Water Resource Investment Strategy, include realigning the creek and breaching the Laguna Seca Dam/Fisher Creek Dam (ESA 2021). These strategies would improve water storage in the floodplain and may have multiple benefits for connectivity such as creating new corridors and increasing habitat cover in the valley.</li> </ul>
Laguna Seca	<ul style="list-style-type: none"> <li>• <b>Wetland Restoration:</b> The Open Space Authority’s Coyote Valley Master Plan, which is currently in development (Santa Clara Valley Open Space Authority 2021), is anticipated to include restoration of the Laguna Seca wetland complex. Removal or breaching of the Laguna Seca Dam, and realignment of Fisher Creek may be viable opportunities to partially restore wetland function while retaining opportunities for movement by terrestrial species (ESA 2021; SCVOSA and CBI 2017).</li> <li>• <b>Exotic Animal Management:</b> For Laguna Seca to be functional for native amphibians and reptiles, exotic species would need to be managed or removed (HT Harvey 2020).</li> </ul>

**Table 6: Habitat restoration and enhancement recommendations for Coyote Valley**

Area or Feature	Recommendation
Pond Habitat	<ul style="list-style-type: none"> <li>• <b>Create New Ponds:</b> Habitat north of Bailey Avenue (<b>Figure 2</b>) has the highest potential for establishing habitat connectivity for pond-breeding amphibians and reptiles, due to the hydrology and location within the Laguna Seca and Fisher Creek floodplains.</li> <li>• <b>Create Stepping Stone Ponds:</b> Due to the distance between aquatic and upland habitat on either side of Coyote Valley, stepping stone ponds would likely be necessary near any newly-created, herpetofauna-friendly, crossing structures across Monterey Road and Highway 101. Such ponds could be developed within the foothills west of Laguna Seca (HT Harvey 2020).</li> </ul>
Agricultural Land	<ul style="list-style-type: none"> <li>• <b>Hay Fields:</b> Converting farmland (i.e., land used for hay production) to grazing lands may decrease dense exotic plant growth and increase use by California ground squirrel (<i>Otospermophilus beecheyi</i>), providing refugia and increasing permeability for species such as burrowing owl and California tiger salamander (HT Harvey 2020). Due to current land uses including development in Coyote Valley, such opportunities may be restricted to lands adjacent to or within the foothills (Section 0).</li> <li>• <b>Crop Land:</b> The area north of Richmond Avenue and south of Laguna Avenue, between Fisher Creek and Coyote Creek Parkway (<b>Figure 2</b>), presents the best opportunity to create an additional corridor south of Metcalf Road by converting cropland to orchard and woodland habitat to support movement by medium-size mammals including American badger and bobcat (SCVOSA and CBI 2017).</li> </ul>
Road Crossings	<ul style="list-style-type: none"> <li>• <b>Crossing point vegetation:</b> Canopy cover and vegetation are associated with high use road crossing infrastructure and, specifically, bobcat road crossing hotspots (Gray 2016; Serieys and Wilmers 2019). Habitat restoration to provide a mix of open and vegetated conditions, facilitated by land protection, should be prioritized around existing road crossing points through Highway 101, including Bailey Avenue and Coyote Creek Golf Drive, as well as any new infrastructure on Monterey Road (Serieys and Wilmers 2019).</li> </ul>

**Table 7: Transportation infrastructure improvement recommendations for Coyote Valley**

Area/Feature	Recommendation	Potential Impacts of High-Speed Rail (HSR)
Undercrossing Fencing	In the near term, functionality of Fisher Creek as a movement corridor could be enhanced by replacing fences at the Bailey Road and Palm Avenue bridges (Figure 2) with wildlife-friendly fences and installing exclusionary fencing around the Laguna Avenue bridge to prevent domestic animals from entering the creek (Diamond and Snyder 2016).	Not affected by HSR.
Metcalf Bridge	The Metcalf Road intersection with Monterey Road is a roadkill hotspot (Figure 2; Pathways for Wildlife 2019). Limited potential exists to convert the Metcalf Bridge to a wildlife-only overpass, or to create a dedicated wildlife lane over Highway 101 and Coyote Creek (SCVOSA and CBI 2017). This opportunity is further constrained by the potential at-grade High Speed Rail (HSR) alignment within the Union Pacific rail right-of-way. Therefore, an undercrossing structure near Metcalf Road and/or an overpass north of Bailey Avenue is likely more feasible (SCVOSA and CBI 2017; Wildlife Corridor Technical Working Group 2019).	The HSR alignment would add overhead power lines with high vertical clearance (27 feet) and would generally constrain the Metcalf Road and Monterey Road intersection (California High-Speed Rail Authority 2022a).
Bailey Avenue	<p>The area around the Bailey Avenue exit of Highway 101 (Figure 2) is a documented roadkill hotspot and a crossing hotspot for bobcat (Diamond and Snyder 2016; Serieys and Wilmers 2019). The <i>Coyote Valley Landscape Linkage</i> (SCVOSA and CBI 2017) proposes converting or adding a vegetated wildlife dispersal lane to the existing Bailey Bridge, which may require widening the overpass. Bailey Bridge is also included as a route in the proposed North Coyote Valley Bay Area Ridge Trail, connecting recreational trails at Coyote Creek Parkway (Bay Area Ridge Trail 2020).</p> <p>The Wildlife Corridor Technical Working Group (2019) suggests a new, dedicated wildlife overcrossing north of Bailey Ave to provide a path for species which typically avoid undercrossings. The overpass would be supplemented by undercrossings near Emado Avenue and Laguna Avenue (Figure 2), which are included in the HSR designs.</p>	<p>The Bailey Avenue Bridge would remain as-is. However, HSR designs include construction of two new under-crossings with jump-out features in the area: one south of Emado Avenue and one near Laguna Avenue. The structures would span the rail line and Monterey Road, opening to Coyote Creek Parkway on the east side (California High-Speed Rail Authority 2022a).</p> <p>Due to the planned HSR alignment, the design of a new overcrossing north of Bailey Avenue would have to be raised over the alignment (California High-Speed Rail Authority 2022a).</p>

**Table 7: Transportation infrastructure improvement recommendations for Coyote Valley**

Area/Feature	Recommendation	Potential Impacts of High-Speed Rail (HSR)
	<p>Relative to baseline data collected in 2008, there are currently low rates of wildlife passage at the Fisher Creek Bridge at Bailey Avenue. Removing restrictive fencing and clearing sediment from this structure may substantially improve its capacity to facilitate movement by large mammals such as deer (Diamond and Sandoval 2023).</p>	
<p>Santa Teresa Blvd</p>	<p>Wildlife movement occurs at-grade along Santa Teresa Blvd between Laguna Seca and Tulare Hill and the North Coyote Valley Conservation Area (Diamond and Sandoval 2023). However, restrictive fencing and a lack of protected crossing structures limit wildlife permeability, which can be enhanced through the following priority actions:</p> <ul style="list-style-type: none"> <li>• Replace fencing near Laguna Seca with wildlife-friendly fencing, or remove (as feasible) to increase permeability;</li> <li>• Replace restrictive gates at protected properties with permeable designs that are compatible with livestock; and</li> <li>• Create a dedicated wildlife crossing structure (e.g., culvert) with directional fencing near Laguna Seca.</li> </ul>	<p>Not affected by HSR.</p>
<p>Highway 101 Culverts</p>	<p>Movement across Highway 101 is supported by existing underpasses and culverts (Phillips et al. 2012; Pathways for Wildlife 2019). However, functionality may be limited by debris, sediment build-up, and livestock fencing (Diamond and Snyder 2016; Pathways for Wildlife 2019). The following are priority maintenance actions (SCVOSA and CBI 2017; Diamond and Sandoval 2023), which require partnership between Valley Transportation Agency and Caltrans:</p> <ul style="list-style-type: none"> <li>• Installation of directional fencing to guide animals to crossing points;</li> <li>• Repair and replacement of exclusion fencing to prevent animals from entering the highway;</li> <li>• Relocating restrictive fencing away from culvert entrances; and</li> </ul>	<p>Not affected by HSR.</p>

**Table 7: Transportation infrastructure improvement recommendations for Coyote Valley**

Area/Feature	Recommendation	Potential Impacts of High-Speed Rail (HSR)
	<ul style="list-style-type: none"> <li>Maintaining culverts regularly, including clearing sediment build-up and debris, and/or retrofitting structures, to promote passage by medium and large-size animals.</li> </ul> <p>Camera monitoring pre- and post-maintenance activities can enable evaluation of the efficacy of these improvements.</p>	
<b>Monterey Road</b>		
Median Barrier	<p>The concrete median barrier is considered a significant barrier to connectivity. Near-term strategies to reduce mortality and barrier effects include: 1) widening existing gaps at intersections with Metcalf Road, Blanchard Road, and Bailey Avenue (Wildlife Corridor Technical Working Group 2017), and 2) creating additional gaps at roadkill hotspots near Tulare Hill and Blanchard Avenue (<b>Figure 2</b>; Pathways for Wildlife 2019). The benefit of widening existing median gaps may be affected by HSR design, described under Potential Impacts of HSR.</p> <p>The City of San José’s General Plan, <i>Envision San José 2040</i> (City of San José 2011), includes actions to replace or perforate portions of the Monterey Road median barrier. Large-scale replacement of the existing median with a cable or W-beam guardrail would broadly increase permeability, though may be less feasible due to safety concerns (Wildlife Corridor Technical Working Group 2019).</p>	<p>The HSR designs include proposed wildlife intrusion deterrents, with jump-out features, for the at-grade road intersections of Blanchard Road, Palm Avenue, Live Oak Avenue and Bloomfield Avenue. Depending on their design, these may prevent animals from accessing the road at these points (California High-Speed Rail Authority 2022a).</p>
Tulare Swale Undercrossing	<p>A new crossing structure at Tulare Swale may be more cost-effective than similar undercrossings at Emado Avenue and Blanchard Road (<i>Bailey Bridge</i>, above; Wildlife Corridor Technical Working Group 2019). This riparian habitat crossing would connect Tulare Hill with Coyote Creek. Such a crossing structure is included under the HSR designs, described under Potential Impacts.</p>	<p>The HSR designs include construction of a new underpass, with three culverts and jump-out features, south of Metcalf Road at Tulare Swale (California High-Speed Rail Authority 2022a).</p>
Fisher Creek Culvert	<p>The Fisher Creek culvert is currently the primary connection for wildlife across Monterey Road but the structure has limited functionality from seasonal flooding and debris. Removing or filling in the concrete riprap on the west</p>	<p>The HSR designs propose retrofitting the Fisher Creek culvert to increase the overall width and height and adding a jump-out</p>

**Table 7: Transportation infrastructure improvement recommendations for Coyote Valley**

Area/Feature	Recommendation	Potential Impacts of High-Speed Rail (HSR)
	<p>entrance would allow more species to enter the culvert in the short-term (Pathways for Wildlife 2019).</p> <p>Large-scale redesign of the culvert is included in HSR project plans and retrofitting should be accompanied by restoration of the adjacent habitat to enhance vegetative cover (Wildlife Corridor Technical Working Group 2019). Any enhancement would require additional collaboration with Valley Water.</p>	<p>feature (California High-Speed Rail Authority 2022a).</p>
<p>Blanchard Road Undercrossing</p>	<p>An undercrossing at Blanchard Road could be designed to support amphibian and reptile crossing between Fisher Creek and Coyote Creek Parkway (SCVOSA and CBI 2017; HT Harvey 2020).</p>	<p>An undercrossing here is unlikely to be directly affected by HSR.</p>
<p>Additional Undercrossings</p>	<p>Multiple additional wildlife crossing structures for Monterey Road were proposed by the Wildlife Corridor Technical Working Group (2019) and are included under HSR project design:</p> <ul style="list-style-type: none"> <li>• A small (5' x 5') undercrossing at Richmond Avenue;</li> <li>• A medium (40' x 15') undercrossing with jump-outs between the Coyote Creek Golf Access road and Fox Lane;</li> <li>• A small undercrossing south of Fox Lane, at Paquina Espata Court;</li> <li>• A small undercrossing with a jump-out, north of Kalana Avenue, connecting to Coyote Creek Parkway; and</li> <li>• A medium undercrossing with jump-outs, south of Live Oak Ave.</li> </ul>	<p>The proposed wildlife crossings within HSR designs are described under Recommendations (California High-Speed Rail Authority 2022a).</p>

In 2023, Valley Water worked with Caltrans to conduct maintenance and clear blockages from four culverts on Highway 101 and planning is ongoing for maintenance of additional culverts. Additional enhancements to permeability are planned for 2024, including creation of a wildlife jump-out (an earthen escape ramp) and realignment cyclone fencing west of Highway 101, south of Coyote Creek Golf Drive (Calnan and Lockwood 2023).

Enhancement projects along Monterey Road could be negatively affected by the development of High-Speed Rail, which is proposed to be aligned within the current Union Pacific Rail line adjacent to Monterey Highway (**Figure 2**). High-speed rail would be largely installed at grade and continuously fenced through Coyote Valley. Designs for the preferred project alternative include several wildlife crossing structures and intrusion deterrents for at-grade intersections at Blanchard Road, Palm Avenue, Live Oak Avenue and Bloomfield Avenue (California High-Speed Rail Authority 2022b).

#### 4.1.2 Future Studies

The following lists the additional studies that have been recommended to inform habitat connectivity work in Coyote Valley:

1. **Laguna Seca Herpetofauna Occupancy:** Evaluate the occurrence of western pond turtle in Laguna Seca (**Figure 2**), as well as potential dispersal of amphibians through the Laguna Seca drainage to provide additional information on the viability of enhancing the area for native amphibians and reptiles (HT Harvey 2020).
2. **Feasibility of Converting Farmland to Annual Grassland:** Additional study is required to identify candidate locations and the feasibility of acquiring land or establishing management agreements with landowners to convert cropland to grazing lands to promote use by California tiger salamander and mesocarnivores (HT Harvey 2020).
3. **Seasonal Creek Flow and Wildlife Movement:** Targeted monitoring may provide additional data on the function Fisher and Coyote creeks as corridors during seasonal high-flow or flooding events (SCVOSA and CBI 2017).

The Coyote Valley Master Plan, which is in the process of being developed, may identify additional studies and analyses to inform connectivity in the region.

## 4.2 Pajaro River

The Upper Pajaro River Valley is an important corridor between the Santa Cruz Mountains and the Diablo Range, which also supports connectivity to the Gabilan Range (**Figure 3**; TNC 2004, Spencer et al. 2010). The Pajaro River is as a Key Riparian Linkage (Penrod et al. 2013; Section 3.3). This focal area includes linkages 18, 19, 20 and riparian Linkages 11, and 12 in the Habitat Plan (Appendix A; ICF 2012).

Highway 101 and SR 25 create 'pinch points' in the Upper Pajaro River linkage (**Figure 3**; Penrod et al. 2013). The segment of Highway 101 south of Tar Creek is a CDFW Top Priority Barrier due to the continuous concrete median which obstructs passage and can trap wildlife in the roadway (Clevenger and Kociolek 2006; CDFW 2022). State Route 25 and a network of other rural roadways cross through the agricultural landscape. Existing wildlife crossing infrastructure (culverts and bridges) currently facilitates movement across highway barriers but directional fencing and consistent maintenance to remove sediment and debris can promote usage of these structures and reduce roadkill (Diamond et al. 2022; Section 4.2.3).

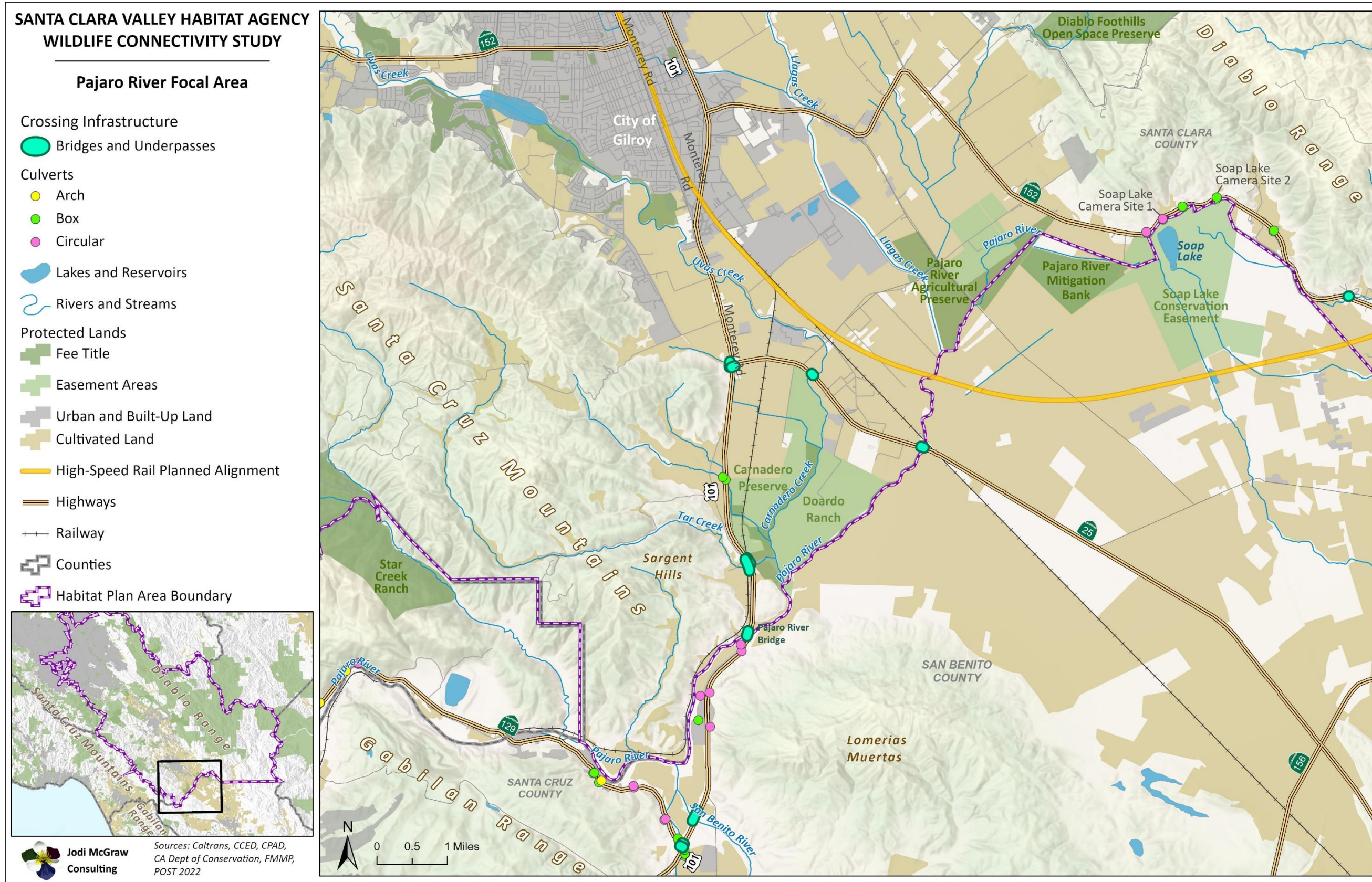


Figure 3: Pajaro River Focal Area

Planned transportation projects, including reconstruction of the Highway 101 and SR 25 interchange (Santa Clara Valley Transportation Authority 2022), widening of Highway 101 and SR 25 (Santa Clara Valley Transportation Authority 2013; Caltrans 2022), and development of an SR 152 Trade Corridor may increase traffic and further fragment the landscape (Section 2.1.5.3). In this area, high-speed rail would be on a viaduct running south from Gilroy towards Bolsa Road and crossing the Pajaro between SR 25 and Frazier Lake Road (**Figure 3**).

Proposed development projects could reduce habitat integrity and connectivity through the Upper Pajaro Valley. Notably, a sand mine is proposed for the southern tip of the Santa Cruz Mountains near Tar Creek, and commercial development is proposed between the Lomerias Muertas (Flint Hills) and SR 25 and in ‘commercial nodes’ along Highway 101 including a node near the confluence of the Pajaro and San Benito rivers (**Figure 3**). Protecting habitat for connectivity can also help reduce the risk of flooding on lives and property in the Upper Pajaro River floodplain, where maintaining or increasing the ability of the Soap Lake Floodplain to function as a detention basin can reduce the risk of flood on downstream communities including Watsonville and (Wallace Group 2021; Pajaro River Watershed Flood Prevention Authority 2023).

Land within the Pajaro River Valley straddles the Santa Clara and San Benito county lines, which delineates the Habitat Plan Area as well as jurisdictions for other conservation and transportation agencies and organizations. To maximize the benefits of connectivity work in the area, projects should be developed in coordination with the conservation and transportation agencies and organizations working in the region, which include the Open Space Authority, San Benito Agricultural Land Trust, Amah Mutsun Land Trust, Trust for Public Land, POST, Caltrans, California High-Speed Rail Authority, and Valley Transportation Authority, and members of the Pajaro River Watershed Flood Prevention Authority—an inter-agency collaborative governing body which identified the Soap Lake Floodplain as a priority for protection (RMC Water and Environment 2005).

In this focal area, efforts to protect and enhance connectivity should focus on protecting existing habitat in the Southern Santa Cruz Mountains and Diablo Range foothills and improving permeability across transportation infrastructure and through cultivated lands in the valley (Diamond and Snyder 2013; Diamond et al. 2022).

#### 4.2.1 Habitat Protection

Habitat protection efforts should prioritize habitat within the Key Riparian Linkage along the Pajaro River and its tributaries between the tip of the Santa Cruz Mountains and the toe of the Diablo Range Mountains (**Figure 3**), as well as riparian corridors connecting outside the Plan Area including the San Benito River (ICF 2012; Diamond and Snyder 2016). Maintaining existing blocks of contiguous, usable habitat, including more permeable cultivated lands, will help maintain multiple movement pathways through the floodplain (Diamond and Snyder 2013). Protection and restoration of a natural river system can additionally provide co-benefits of flood protection by creating natural infrastructure which allows flood waters to move through the floodplain without affecting development.

Table 8 lists priority areas for habitat protection based upon the review of the literature and data (Section 3). Land protections should generally coincide with habitat restoration projects and aim to preserve or create corridors accessible to multiple taxonomic groups (i.e., amphibians, reptiles, small mammals, and large carnivores).

1. **Upland Habitat:** Land ownership is largely consolidated in the hills west of Hwy 101, making the area advantageous for large acquisitions through fee title or easement. The area features open grassland, oak woodland, and pond habitat of moderate and high conservation effort in the Habitat Plan (conservation analysis zones: Uvas-5-6 and Pescadero-6; Appendix A; ICF 2012).

The Sargent Quarry Project proposes creation of a 403-acre sand and gravel mine west of Highway 101 immediately adjacent to multiple undercrossings including Tar Creek and the Pajaro River Bridge (**Figure 3**). The project is currently undergoing environmental review and designs include measures to mitigate disturbance to wildlife movement, such as fencing around the project site and incorporating wildlife-friendly design into construction of a bridge over Tar Creek (County of Santa Clara and ESA 2022). Due to the anticipated projects impacts to connectivity between the Sargent Hills and Upper Pajaro Valley, conservation effort should focus on protecting adjacent lands with intact habitat (Diamond et al. 2022).

2. **Soap Lake Floodplain and Adjacent Upland Habitat:** Habitat in and around the Soap Lake Floodplain (conservation analysis zone Pacheco-8; Appendix A) supports connectivity between the Diablo Range and Upper Pajaro (ICF 2012). Soap Lake (San Felipe Lake) also provides a year-round water source and has high rates of animal movement documented at creek culverts (Diamond et al. 2022).

North of the Soap Lake Ranch Conservation Easement (**Figure 3**), several large, contiguous parcels featuring annual grassland and valley oak woodland provide foraging habitat for aquatic species which breed at San Felipe Lake (RMC 2005; ICF 2012). Land protection here may facilitate habitat management and restoration across a range of elevation gradients and enable maintenance of crossing structures which connect the lake with intact upland habitat in the foothills and Henry W. Coe State Park (ICF 2012; Diamond et al. 2022).

The Soap Lake Floodplain Preservation Project provides funding to target acquisition of agricultural and open spaces through flood easements (RMC Water and Environment 2005).

3. **Riparian and Riverine Habitat:** Due to the importance of stream corridors in facilitating terrestrial species movement as well as supporting aquatic species, additional acquisitions by Habitat Agency partners should target farmland around streams where protecting and restoring habitat between the existing conservation investments could strengthen the connectivity value of the river corridor (Diamond et al. 2022). Additional protection projects could work to connect the 1,174 acres south of SR 25 to the 689 acres north of Llagas Creek (**Figure 3**; Section 2.2.2).

4. **Agricultural Lands:** Protecting agricultural land near road crossings would enable infrastructure improvements and contribute to creating multiple routes for wildlife to disperse during disturbance events like flooding. Existing high use road crossing sites which may benefit from adjacent land protection and potential restoration include the Pajaro River Bridge at SR 25 and the confluences of Llagas Creek with the Pajaro River and Jones Creek (**Figure 3**; Diamond and Snyder 2013; Diamond et al. 2022). Agricultural land protection should additionally be prioritized in areas with existing riparian habitat and increased canopy cover, or high potential for riparian restoration (Gray 2016).

An autonomous vehicle testing ground project, proposed for development south of SR 25 (County of San Benito 2022), could significantly restrict opportunities to enhance the permeability of agricultural lands between the Santa Cruz Mountains and Diablo Range, through the Upper Pajaro Valley. Additional research is recommended to assess the connectivity and conservation value of specific properties in the valley in the context of existing and potential future land uses (Section 4.2.4).

5. **Betabel Road Commercial Development Node:** A multiphase roadside development project is planned on the 112-acre area bounded by the San Benito River, Pajaro River, and Highway 101 just south of the Plan Area. Construction has begun on an initial phase of development and subsequent phases are currently undergoing environmental review (Ascent 2022). The San Benito River, and its connection to the Pajaro River, supports connectivity from the Gabilan Range to the Santa Cruz Mountains and protection of the riparian and upland habitat adjacent to the proposed project site (conservation analysis zone Pescadero-1; Appendix A; ICF 2012) can contribute to maintaining this regional connection (Diamond et al. 2022).

#### 4.2.2 Habitat Restoration and Enhancement

Habitat restoration along the Pajaro River corridor can facilitate movement by animals between the mountain ranges using the riparian corridor and broader floodplain. Wide, vegetated streams that feature dry banks are particularly important to facilitate animal movement during high flow periods (Gray 2016; Diamond et al. 2022). In San Benito County, riparian corridors receive some protection under the county ordinance; however, much of the river and stream network in Santa Clara County is narrow, channelized, and flanked by intensive agriculture.

The following areas are priorities for restoration and enhancement, some of which are covered under current or planned restoration projects and are designed to support riparian, riverine, wetland, and adjacent upland habitat that can collectively increase the permeability of the Upper Pajaro River:

1. **Uvas Creek:** The Santa Clara RCIS and the Habitat Plan both include actions to enhance aquatic stream habitat with woody debris and spawning gravel. Valley Water's 5-year Implementation Plan for the Safe, Clean Water & Natural Flood Protection Program includes a Bolsa Road Fish Passage Project which is intended to enhance stream function in Uvas Creek for steelhead and may benefit other aquatic species (Valley Water 2021).

Additional opportunities to work with landowners on improving natural streamflow, introducing large woody debris, and modifying substrate should be investigated further (ICF 2017; Section 4.2.4).

2. **Pajaro River:** The Santa Clara RCIS identified restoration of the Pajaro River, north of SR 25 (**Figure 3**), as a conservation priority with importance to regional connectivity. In coordination with the Open Space Authority and Point Blue Conservation Science, the Habitat Agency has begun construction on initial phases of the Pajaro River Agricultural Preserve Restoration Project. The project will include streambank enhancement and riparian restoration for the Pajaro from its confluence with Llagas Creek to Frazier Lake Road (SCVOSA 2020).

Additional land acquisitions north of SR 25 may facilitate restoration of critical riparian habitat on current privately owned lands on either side of the Pajaro River (ICF 2017; Diamond et al. 2022).

3. **Habitat Management Agreements:** Establishing collaborative management agreements, such as Safe Harbor Agreements, can incentivize landowners to maintain baseline conditions and potentially enhance habitat for special-status species. The Santa Clara RCIS and the Habitat Plan recommend targeting such agreements towards species like tri-colored blackbird, California red-legged frog, and western pond turtle (ICF 2012; ICF 2017). Habitat protection and enhancement for these species may produce secondary benefits to other species which rely on pond, marsh, and riparian habitats (ICF 2017).

4. **Upland Habitat:** In conjunction with land protections (Section 4.2.1), upland habitat should be managed to support California ground squirrel to improve habitat and food resources for native species, including burrowing owl, California tiger salamander and American badger. Contingent on participation of landowners, the extensive uplands in conservation analysis zone Pacheco-8 and Uvas-5 (Appendix A; ICF 2012) would be advantageous locations for enhancement due to the presence and density of pond and stream habitat (ICF 2017).

#### 4.2.3 Transportation Infrastructure

Transportation corridors, and associated wildlife crossing infrastructure, in the Upper Pajaro Valley have significant influence on connectivity between the Santa Cruz Mountains, Gabilan Range, and Diablo Range (Diamond et al. 2022). The existing crossing infrastructure is largely functional for conveying wildlife under the primary roadways in the area, including Highway 101, SR 25, and SR 152. However, transportation improvement projects planned within the linkage area may present additional constraints on movement as well as potential opportunities for crossing infrastructure enhancements (Section 2.2.2).

**Table 8** summarizes the recommended connectivity enhancement strategies developed by Diamond et al. (2022) based on monitoring of wildlife crossing infrastructure and prior studies (i.e., Diamond and Snyder 2013; Gray 2016).

#### 4.2.4 Future Studies

The following data gaps are recommended to be addressed through additional studies (Diamond et al. 2022):

1. **Use of Agricultural Lands by Wildlife:** Existing monitoring data highlight the usage of riparian corridors through agricultural lands based on monitoring transportation infrastructure crossings; however, the use of cultivated land by species is poorly understood (Diamond et al. 2022). Information about the use of agricultural lands by wildlife could be further obtained through camera monitoring and habitat analyses, as conducted by Gray (2016).
2. **Land Use Data:** To model connectivity at an appropriately fine scale in the Upper Pajaro Valley, additional data on land use, including type of agricultural uses (e.g., row crops or specialty crops) is needed, though may be challenging to develop given the dynamic nature of agriculture in the area.
3. **Habitat Protection and Enhancement Plan:** A focused plan should be developed to identify habitat for protection and enhancement in this linkage, similar to a plan that is being developed for the Santa Cruz Mountains to Gabilan Range Linkage.

**Table 8: Transportation infrastructure improvement recommendations for the Upper Pajaro River**

Area/Feature	Recommendations	Related Projects
<b>Highway 101</b>		
Concrete Median	The continuous concrete median south of Tar Creek ( <b>Figure 3</b> ) inhibits movement across the highway and may contribute to increased risk of vehicle strike for large mammals such as deer or mountain lion (CDFW 2022).	The Highway 101 Improvement project would incorporate gaps in the median to enable wildlife passage (VTA 2013).
Carnadero Creek Bridge	This undercrossing has minimal documented use by native wildlife, potentially due to adjacent development; as a result, enhancements should instead be prioritized at locations further south, such as Tick Creek (Diamond et al. 2022)	The planned Highway 101 and SR 25 interchange project may impact stream habitat (VTA 2022).
Gavilan Creek Culvert	The culvert has minimal documented use by native species and is adjacent to agricultural and residential development. Frequent ponding water may prevent passage and the site could be improved by vegetation management, sediment removal, and installation of dry shelves (Diamond et al. 2022).  Due to the extent of restoration necessary to enhance functionality at this site, Tick Creek may be a more advantageous location for improvements (Diamond et al. 2022).	The Highway 101 and SR 25 interchange project will construct a longer southbound Highway 101 bridge over Gavilan Creek to allow flood conveyance (VTA 2022). This may negate the ultimate Highway 101 Improvement Project which planned to extend the existing Gavilan Creek culvert and to create additional culverts north of SR 25 (VTA 2013).
Tick Creek Culvert	This concrete double box culvert ( <b>Figure 3</b> ) supports movement primarily by mesocarnivores (Diamond and Snyder 2013; Diamond et al. 2022). Managing the dense vegetation obstructing the entrance and installing directional fencing towards the culvert may enhance its function (Diamond and Snyder 2013; Diamond et al. 2022).  Ultimately, the current double-box culvert should be replaced with a naturally floored elliptical culvert installed with directional fencing (Penrod et al. 2013; Diamond et al. 2022). However, it may be more immediately feasible to collaborate with Caltrans on near-term enhancement of the culvert through the Highway 101 project.	The Highway 101 Improvement Project plans would include the following infrastructure modifications (VTA 2013): <ul style="list-style-type: none"> <li>• Extending the current culvert under Highway 101 to 220 feet;</li> <li>• Replacement of the culvert at Monterey Road, to the west, with a lengthened design; and</li> <li>• Addition of a double culvert at the access road on the east side.</li> </ul>
Tar Creek Overpass	The overpass ( <b>Figure 3</b> ) is a significant connection between intact habitat to the west and protected agricultural lands in the east ( <b>Figure 3</b> ), with high	The proposed sand and gravel mine in the Sargent Hills to the west (Section 4.2.1) would impact adjacent habitat; additionally, the project design includes a free-span

**Table 8: Transportation infrastructure improvement recommendations for the Upper Pajaro River**

Area/Feature	Recommendations	Related Projects
	<p>documented use by native species, including American badger and long-tailed weasel (<i>Neogale frenata</i>; Diamond and Snyder 2013; Diamond et al. 2022).</p> <p>Directional fencing, specifically at the access road to the west, may reduce the incidence of roadkill near the overpass (Diamond and Snyder 2013; Diamond et al. 2022).</p>	<p>vehicular access bridge over Tar Creek, west of the Highway 101 overpass, which may deter wildlife but will be designed to allow wildlife undercrossing.</p> <p>The Highway 101 Improvement Project includes the following elements that would have beneficial and negative effects on connectivity (VTA 2013):</p> <ul style="list-style-type: none"> <li>• Removal of the northbound bridge and widening of existing southbound bridge;</li> <li>• Construction of a single-span, bike access bridge over Tar Creek;</li> <li>• Addition of a new culvert between Tar Creek and the Pajaro River, with a 4’ minimum height;</li> <li>• Construction of a new bridge for the Tar Creek access road;</li> <li>• Installation of wildlife exclusion fencing with jump-out features from 0.25 miles north Tar Creek to south of the San Benito Bridge; and</li> <li>• Post-construction site monitoring.</li> </ul>
<p>Pajaro River Bridge</p>	<p>The Pajaro River Bridge facilitates a high rate of native species passage, including by bobcat and deer (Diamond and Snyder 2013; Diamond et al. 2022). Land protection adjacent to the site is recommended to maintain functionality (Diamond et al. 2022).</p>	<p>The Highway 101 Improvement Project would introduce the following changes (VTA 2013):</p> <ul style="list-style-type: none"> <li>• Replacement of the current 4-span bridge with a larger 3-span bridge.</li> <li>• Installation of wildlife exclusion fencing with jump-out features from 0.25 miles north Tar Creek to south of the San Benito Bridge.</li> <li>• Post-construction site monitoring.</li> </ul>

**Table 8: Transportation infrastructure improvement recommendations for the Upper Pajaro River**

Area/Feature	Recommendations	Related Projects
Betabel Road and Y Road Interchange	A small circular culvert crosses Highway 101 on the north side of the interchange ( <b>Figure 3</b> ). Current studies have not monitored this site but a 2019 inspection noted a lack of light through the passage which may deter wildlife (Peninsula Open Space Trust (POST) 2022).	The Highway 101 Improvement project would replace the existing concrete culvert in the north with a larger box culvert and monitoring is planned, post-construction (VTA 2013).
San Benito River Bridge	<p>This large two-span bridge located south of the Plan Area (<b>Figure 3</b>) supports passage of a diverse assemblage of native species, including deer and mountain lion and is recommended for the following enhancements:</p> <ul style="list-style-type: none"> <li>• Install fencing between northbound and southbound lanes where the riparian area meets the highway;</li> <li>• Manage bank conditions to maintain dry, navigable areas for wildlife movement; and</li> <li>• Protect habitat and conduct wildlife-friendly management of adjacent lands (Diamond et al. 2022).</li> </ul>	<p>The development project at Betabel Road (Section 4.2.1) may disrupt movement from this site to the adjacent Pajaro River corridor (Ascent 2022).</p> <p>The Highway 101 Improvement project would introduce the following changes and impact connectivity positively and negatively (VTA 2013):</p> <ul style="list-style-type: none"> <li>• Widening of both northbound and southbound bridges;</li> <li>• Installation of wildlife exclusion fencing with jump-out features from 0.25 miles north Tar Creek to south of the San Benito Bridge; and</li> <li>• Post-construction monitoring.</li> </ul>
<b>SR 152</b>		
San Felipe Lake Culverts	<p>The two culverts adjacent to the lake (<b>Figure 3</b>) facilitate movement between the lake and intact upland habitat north of the highway, but wildlife vehicle collisions on SR 152 in this area led to the following recommendations (Diamond and Snyder 2013; Diamond et al. 2022):</p> <ul style="list-style-type: none"> <li>• Site 1-North of the Lake: Clear sediment from the dual round culverts directly north of the lake or replace the existing structure with an elliptical culvert or concrete box culvert with wing-fencing and jump-out features.</li> <li>• Site 2-East: Modify the fencing on the south side and conduct vegetation management in the north to enhance function, and add a new culvert, similar to Site 1, as feasible.</li> </ul>	The alignment of the SR 152 Trade Corridor project will connect with SR 152 in the east; the impact to connectivity will depend on the final alignment (VTA 2020).

**Table 8: Transportation infrastructure improvement recommendations for the Upper Pajaro River**

Area/Feature	Recommendations	Related Projects
Culverts East of San Felipe Road (Badger Roadkill Hotspot; Diamond et al. 2022)	<p>Concentrated American badger roadkill on SR 152 east of San Felipe Road, and monitoring of three culverts in this area from 2019-2020 led to the following recommendations (Diamond et al. 2022):</p> <ul style="list-style-type: none"> <li>• Monitor and maintain the structures to clear debris;</li> <li>• Add wildlife fencing between crossings to direct wildlife to the structures; and</li> <li>• Create additional, dedicated crossing infrastructure suitable for deer and American badger.</li> </ul>	<p>The alignment of the SR 152 Trade Corridor project will connect with SR 152 in the east; the impact to connectivity will depend on the final alignment(VTA 2020).</p> <p>High-speed rail will introduce noise, light, and construction disturbance in the area (California High-Speed Rail Authority 2022a).</p>
<b>SR 25</b>		
Uvas-Carnadero Creek Bridge	<p>Protection of land adjacent to the bridge is recommended to improve land management practices and to safeguard connectivity through the structure, which facilitates native species movement but may be impacted by adjacent farming activity and seasonally high water levels in the creek (Diamond and Snyder 2013; Diamond et al. 2022).</p>	<p>This site may be affected by development of the SR 152 Trade Corridor which includes potential realignment of SR 25 ( VTA 2020).</p>
Pajaro River Bridge	<p>This site has similar functionality and recommendations are similar to that of the Uvas-Carnadero Creek Bridge (above). Additionally, directional fencing is recommended at this site (Diamond and Snyder 2013).</p>	<p>This site may be affected by development of the SR 152 Trade Corridor which may widen the existing highway in this area, or add a new alignment north of SR 25, crossing the Pajaro.</p>

### 4.3 Pacheco Pass

Pacheco Pass is a critical linkage within the Diablo Range Mountains, which are an important block of the Inner Coast Range Mountains (Penrod et al. 2013). The Pacheco Creek corridor and surrounding undeveloped lands support a diverse assemblage of wildlife including tule elk, mountain lion, and American badger which move over large ranges and have low population densities (Pathways for Wildlife 2020a). The area may additionally provide connectivity for San Joaquin kit fox which are poorly documented in the Plan Area but are expected to have increased habitat suitability in the Plan Area under climate change (Stewart et al. 2016; ICF 2017).

The Pacheco Pass focal area includes Linkages 15 and 17 from the Habitat Plan (Appendix A) and connects the protected areas of Cañada de los Osos Ecological Reserve and Henry W. Coe State Park in the north with Pacheco Creek Reserve and Pacheco State Park in the south (**Figure 4**; Section 2.2.3).

Running adjacent to Pacheco Creek, SR 152 bisects the linkage and is considered one of 12 Top Priority Wildlife Movement Barriers in the state by CDFW for mountain lion, mesocarnivores, and tule elk (CDFW 2022). Existing underpasses facilitate wildlife movement under the highway but a high number of wildlife-vehicle collisions are recorded in the pass (Pathways for Wildlife 2020a). Storm events seasonally inundate the existing crossing structures and deposit debris and sediment, reducing their functionality and potentially contributing to increased rates of roadkill (Pathways for Wildlife 2020a; Pathways for Wildlife 2023)

The Pacheco Reservoir Expansion project may directly and indirectly impact wildlife movement through construction disturbance, habitat loss, changes to water quality and flow regimes during and post-construction, and creation of new operations infrastructure (Section 2.2.3; Valley Water 2021). High-Speed Rail is planned to be on aerial alignment from Casa de Fruta to the Pacheco Creek Bridge south of Cañada de los Osos Ecological Reserve (**Figure 4**), where the alignment would transition to a tunnel for approximately 13.5 miles (California High-Speed Rail Authority 2022b). The proposed tunnel entrance would require significant infrastructure improvements which could impact several acres of riparian and upland habitat. The long duration of the construction project, specifically at the entrance of the tunnel, could also impact wildlife use of the Pacheco Creek Bridge nearby within the Habitat Agency's Pacheco Creek Reserve.

In this focal area, connectivity enhancement strategies center on protecting habitat on both sides of the linkage and enhancing permeability across the highway by improving conditions and the number of safe crossing sites (Pathways for Wildlife 2020a).

#### 4.3.1 Habitat Protection

On both side of SR 152, the landscape is dominated by ranchlands which feature grassland, oak woodland, and chaparral communities (Section 2.2.23). Relatively intact habitat and consolidated land ownership in Pacheco Pass create substantial opportunity to protect habitat along a variety of elevation gradients and to connect existing protected areas.

The Habitat Plan land acquisition strategy in Pacheco Pass (conservation analysis zones Pacheco-1, 2, 3, 4, 5, and 6; Appendix A) emphasize the protection of land around crossing points to enable infrastructure enhancements (ICF 2012).

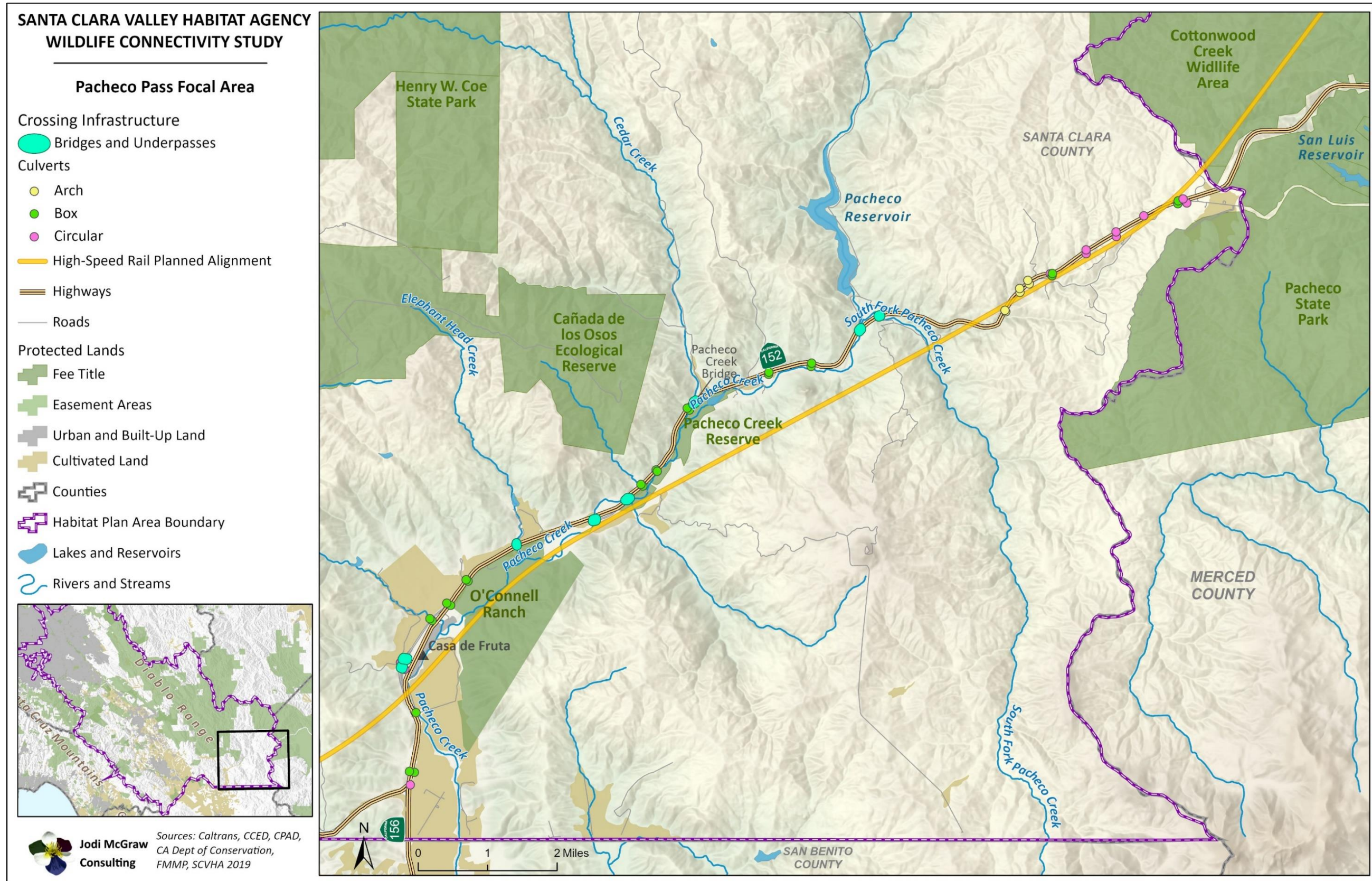


Figure 4: Pacheco Pass Focal Area

The following areas present opportunities for targeted habitat protection:

1. **Grassland Habitat:** Land on the north side of SR 152, northwest of Pacheco State Park and southwest of Cottonwood Creek Wildlife area (**Figure 4**), features gentle slopes and annual grasslands which contain potentially suitable habitat for San Joaquin kit fox (ICF 2017). Habitat protection in this area (conservation analysis zone Pacheco-4; Appendix A; ICF 2012) would provide connectivity between the state park and existing easements in the north. There are also multiple culverts along this segment of SR 152 which have documented use by mesocarnivores, including gray fox (Pathways for Wildlife 2021).

Protection of ponds that occur within a matrix of annual grassland and mixed oak woodlands south of Pacheco Creek Preserve (conservation analysis zone Pacheco-6; Appendix A), could also benefit covered pond-breeding species and potentially tricolored blackbird (ICF 2012).

2. **Riparian Habitat:** The creeks and streams in Pacheco Pass provide habitat for several covered species, including western pond turtle and California red-legged frog, and the riparian corridor facilitates movement by mountain lion and bobcat movement (Pathways for Wildlife 2020b; Pathways for Wildlife 2020a). Protection along the riparian corridor would expand the existing Pacheco Creek Preserve (**Figure 4**) and facilitate potential habitat restoration and connectivity enhancements following the Pacheco Reservoir Expansion project which is expected to alter flow patterns of the creek (Santa Clara Valley Water District 2021; Section 2.2.3).
3. **Transportation Crossing Infrastructure Sites:** Protection of habitat near concentrated roadkill areas would increase the feasibility of conducting transportation infrastructure improvement projects, including installing directional fencing. Such protections should be targeted towards areas with intact habitat on both sides of the highway in areas of concentrated mortality, such as between Elephant Head Creek and South Fork of Pacheco Creek Bridge (**Figure 4**), where relatively high numbers of road kill deer, gray fox, and coyote were observed (Pathways for Wildlife 2020a).

#### 4.3.2 Habitat Restoration and Enhancement

Riparian restoration should be conducted in Pacheco Creek to facilitate use of the riparian corridor by multiple species, including mountain lion (Pathways for Wildlife 2020b). The restoration of the Pacheco Creek Reserve (**Figure 4**) has focused on enhancing riverine and riparian habitat which can improve connectivity through the corridor. The Pacheco Creek Reservoir Expansion project may increase overall flow and lengthen peak flow periods, which currently reduce animal use of culverts and bridge crossings such that streambank enhancements that widen the available habitat may be necessary to maintain function of the corridor (Pathways for Wildlife 2021).

Well-managed cattle grazing can enhance grassland habitat for rare species including San Joaquin kit fox and American badger by reducing the cover of exotic herbaceous plants and promoting California ground squirrel, important prey for both species. However, greater vegetative cover may better support American badger which have been recorded at crossing structures and as roadkill (Bylo et al. 2014; Pathways for Wildlife 2020a).

### 4.3.3 Transportation Infrastructure

Existing underpasses through SR 152 have been used by species of small to large mammals, which are also recorded as roadkill on the highway (Pathways for Wildlife 2020a; Pathways for Wildlife 2023). The highway features a six-mile median barrier from Bell Station to the Merced County line and the existing undercrossings are not functional year-round, or for all species guilds such as tule elk, which have been killed by vehicle strikes near San Luis Reservoir (Pathways for Wildlife 2023; **Figure 4**).

The initial recommendations from the *Wildlife Permeability and Hazards across Highway 152* study and the recently completed *SR-152 Pacheco Pass Regional Wildlife Connectivity Study* by Pathways for Wildlife (2020a, 2023) included installation of directional fencing and critter crossings to improve the rate of successful passage under SR 152. Enhancements at the Pacheco Creek Reserve Bridge are currently being implemented by the Habitat Agency, including improvements to rip rap to allow crossings during high flow events and installation of directional fencing, in conjunction with continued monitoring and study (Pathways for Wildlife 2020b; Valley Habitat Agency 2022).

Movement through existing infrastructure is limited by the presence of debris or riprap, flooding and high-flow events, and presence of non-wildlife-friendly fencing blocking passages (Pathways for Wildlife 2020a; Pathways for Wildlife 2023). The primary impediments to connectivity across SR 152 and recommended improvement strategies are summarized in Table 9.

In Pacheco Pass, the planned high-speed rail alignment would begin on an embankment near Casa de Fruta, before transitioning to a 13.5-mile-long tunnel (Section 2.2.3). As part of construction mitigation, two wildlife movement corridors will be identified and protected through directional fencing and noise walls through consultation with the Habitat Agency, Pathways for Wildlife, and other partners (California High-Speed Rail Authority 2022b). A new wildlife overcrossing is included in mitigation measures for HSR and the Habitat Agency is currently developing a feasibility study to evaluate the opportunities and constraints for a dedicated overpass at multiple potential sites in the area (Valley Habitat Agency 2022) as summarized in Table 9.

#### 4.3.1 Future Studies

Movement through existing culverts is currently disrupted by flood events and several structures, specifically in the eastern portion of the focal area, have 2-4-foot drop-offs downstream which limit accessibility (Pathways for Wildlife 2021). Additional study is recommended to identify opportunities for the following structural improvements: 1) retrofit or replacement of existing culverts with flood resilient designs; 2) improvement of drainage at entrances to prevent excessive ponding; and 3) installation of artificial ramps or natural ramps, with void-filled boulders, at culvert entrances (Pathways for Wildlife 2020a)

**Table 9: Transportation infrastructure improvement recommendations for Pacheco Pass**

Area/Feature	Connectivity Issue	Recommendation
Riprap at Bridge Undercrossings	Riprap is present along the outer banks of the Pacheco Creek Bridge at Pacheco Creek Reserve and South Fork Pacheco Creek Bridge ( <b>Figure 4</b> ), which prevent deer from using the undercrossing when creek flow high and natural banks are flooded (Pathways for Wildlife 2020a).	Enhancement projects to fill riprap with natural substrate are currently being implemented by the Habitat Agency and partners and structures should be monitored following implementation (Pathways for Wildlife 2020a).
Exclusionary Fencing	Barbed wire fencing, primarily livestock exclusion fencing, blocks multiple crossing structures including Upper Pacheco Creek Underpass and South Fork of Pacheco Creek Bridge (Pathways for Wildlife 2021; <b>Figure 4</b> ).	Opportunities should be pursued to collaborate with landowners to modify or replace existing fencing with a wildlife-friendly design (Pathways for Wildlife 2023).
Directional Fencing	A lack of directional fencing to guide wildlife to safe crossings currently contributes to animals accessing the highway and entering traffic.	In additional areas of SR 152, directional fencing should be installed around crossing structures which are heavily used, specifically by large mammals, and in areas of high wildlife-vehicle collisions (Pathways for Wildlife 2020a). A pilot project installing directional fencing along a segment of SR 25, adjacent to the Pacheco Creek Reserve ( <b>Figure 4</b> ), is currently being implemented by the Habitat Agency (Pathways for Wildlife 2020a).
Overcrossing Structure	Culverts and bridge undercrossings are the only existing crossing infrastructure through SR 152 but many species, such as tule elk are unlikely to use undercrossings and may preferentially use large, open-span overcrossings (Phillips et al. 2012).	The design of a new wildlife overcrossing is included as a mitigation measure for HSR in Pacheco Pass (California High-Speed Rail Authority 2022b). This measure includes the establishment of a Wildlife Movement Working Group for Pacheco Pass, which will include the Habitat Agency and partner organizations. A four-year feasibility study is being conducted by the Habitat Agency and partners to identify potential locations and design options for a wildlife overpass (Valley Habitat Agency 2022).

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## Appendix A: Habitat Plan Connectivity Areas

This appendix contains Figure 5-8 from the Habitat Plan (ICF 2012), which illustrates the following three elements that are discussed in this report:

- 1 **Conservation analysis zones** (labeled in pink): Discrete geographic units in the Habitat Plan conservation strategy, which were used to identify specific conservation actions, including land acquisition and enhancement;
- 2 **Conservation effort:** The relative level of land acquisition effort (low, moderate, or high) in each conservation analysis zone, based on requirements outlined in the conservation strategy; and
- 3 **Landscape linkages:** twenty linkages were identified through a review of previous statewide and regional assessments as well as local studies and data on land cover and species habitat models. The linkages were identified at the regional level, in and near the study area and considered for the Reserve System.

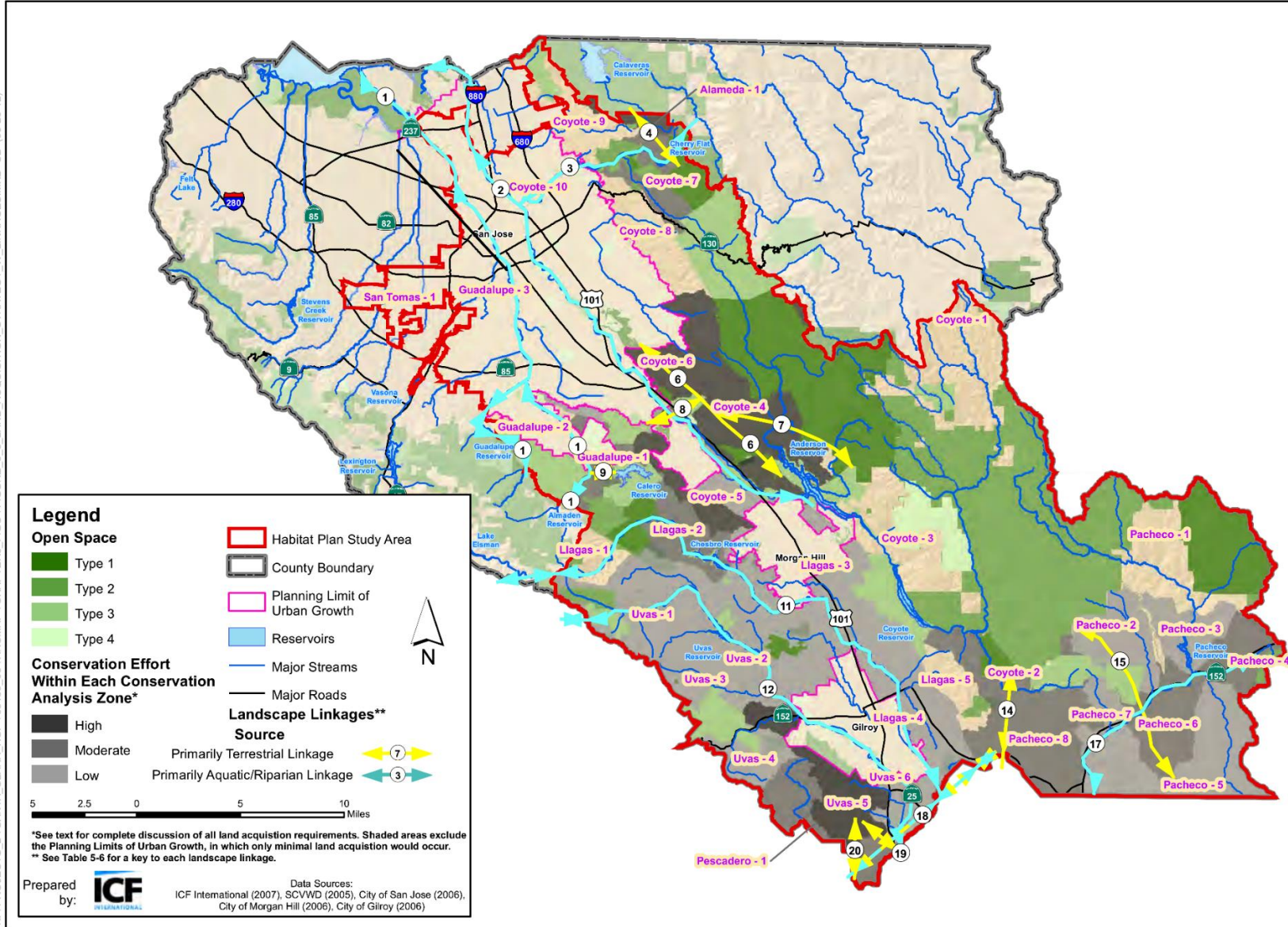


Figure 5-8  
Land Acquisition Strategy with Applicable Landscape Linkages