5.3.37 Habitat Connectivity

Mountain lion recorded traveling through the El Toro Creek Bridge underpass in November 2008.
Photo Credit: Pathways for Wildlife and Big Sur Land Trust

Terrestrial Connectivity

- Areas of Conservation Emphasis (ACE) identified priority areas of terrestrial connectivity. Irreplaceable and Essential Corridors (ACE Rank 5) in and around the RCIS area:
  - Gabilan Range (including Pinnacles National Park)- Santa Cruz mountains corridor (CDFW 2019a)
  - The Santa Lucia Range–Inner Coast Range corridor (Figure 5-33) (CDFW 2019a).
- Conservation Planning Linkages (ACE Rank 4) in and around the RCIS area:
  - Along the Santa Lucia Range from the Fort Ord south to the Carmel River, and further south to the Nacimiento River
  - Carmel River Valley south east to the Inner Coast Range, Monterey Bay dunes and Fort Ord south west to Sierra de Salinas & Toro County Park, and south east to the Carmel River area to Fort Ord and the coastal dunes of Monterey Bay (across Hwy 68) (TAMC 2017)
  - Along the Inner Coast range from Stockdale Mountain to the Gabilan Range (Figure 5-33).

- Bay Area Linkage Network identified large parcels of high ecological integrity, or Landscape Blocks: Gabilan Range and Pinnacles National Park, Inner Coast Range, Santa Lucia Range, Inner Coast Range and Stockdale Mountain (Figure 5-33) (Penrod et al. 2013).
- Types of barriers to terrestrial habitat connectivity include transportation infrastructure and urban development

Aquatic Connectivity

Riparian Corridors

- Riparian corridors facilitate wildlife movement throughout the RCIS area, through unsuitable habitat, such as urban and agricultural areas (Hilty et al. 2006).
- California Essential Habitat Connectivity dataset identified potential riparian corridors that provide access to Landscape Blocks: Salinas River, Gabilan Creek and associated riparian corridor; San Antonio River; Nacimiento River (Spencer et al. 2010).

Fish Passage Barriers

The Fish Passage Assessment Database (CDFW 2019b) identifies barriers in California that hinder migration of salmonids. A total barrier (either natural or artificial) is a complete barrier to fish passage for all anadromous species at all life stages, at all times of year. All total (natural and artificial), and partial (natural and artificial) barriers and the aquatic resources affected by these barriers are shown in Figure 5-33. Major waterways and their direct tributaries that have these barriers include: Pacific Ocean, Garrapata Creek, Big Sur River, San Jose Creek, Carmel River, Arroyo Seco, Limekiln Creek, Mill Creek, San Clemente Creek, Salinas River, Big Creek, Big Sur Creek, Black Rock Creek, Danish Creek, Little Sur River, Prewitt Creek, Willow Creek The Fish Passage Assessment Database also identified the Arizona Crossing, located on private land, as a high-priority barrier affecting anadromous fish, whose migration impacts should be addressed promptly (CDFW 2019b). According to The California Department of Transportation, no other barriers to fish passage occur in the RCIS area (Moonjian, pers. comm, 2019). See steelhead actions for additional priority fish passage barriers.

Table 5-61. shows stressors and pressures as well as actions that address these threats.

Associated Non-Focal Species

- American badger (*Taxidea taxus*)
- Least Bell's vireo (*Vireo bellii pusillus*)
- Little willow flycatcher (*Empidonax traillii brewsteri)*
- Two-striped garter snake (*Thamnophis hammondii)*
- Western spadefoot (*Spea hammondii*)
- Yellow-billed magpie (*Pica nuttallii)*

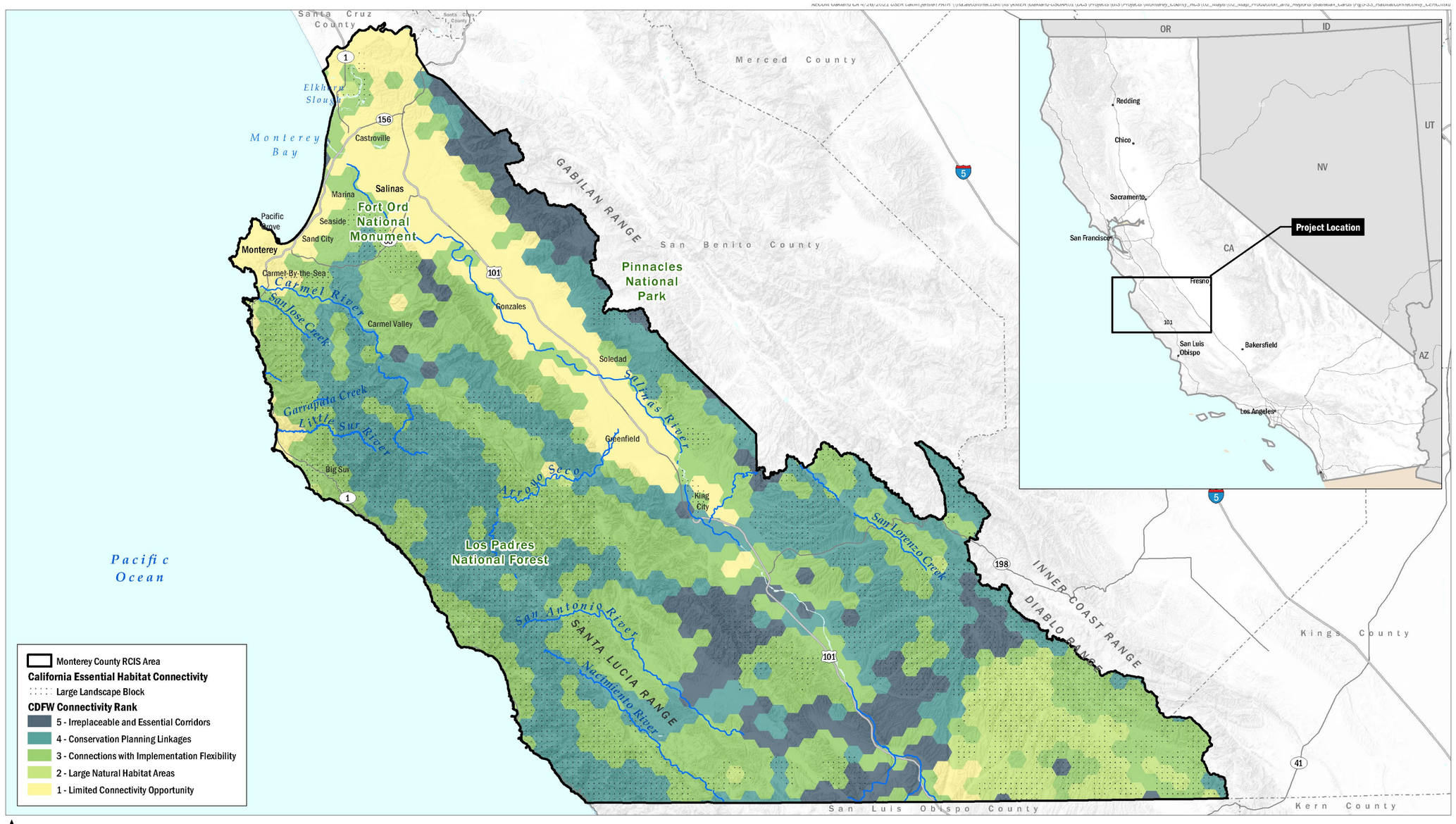
Climate Change Vulnerability Assessment

The loss of habitat connectivity and increased habitat fragmentation will have a major impact on how wildlife and natural communities respond to climate change in the RCIS area. Development of agricultural and urban areas, especially installation of new linear features (e.g., roads and utility lines) or development in critical choke points (areas of constrained movement) can affect plant and wildlife dispersal and predator–prey relationships, leading to increased mortality and genetic isolation. Movement by focal species such as mountain lion can be used as an indicator of healthy connectivity between different terrestrial habitat types and climate change resilience, because of its occurrence in all the natural communities in the RCIS area and its large home range. Irreplaceable and Essential Corridors (ACE Rank 5) and Conservation Planning Linkages (ACE Rank 4) throughout the RCIS area have the potential for high climate change resiliency (ACE Rank 4 and 5) (Appendix B). However, habitat fragmentation and degradation can more acutely impact smaller species and exasperate climate change impacts.

Aquatic species are limited in their abilities to bypass connectivity barriers in streams. Improving fish passage throughout riparian corridors can increase habitat connectivity for steelhead and other water-bound species. Furthermore, maintaining healthy connectivity between freshwater and saltwater habitats is important for maintaining hydrological regimes, water quality, and sediment balances, and may improve climate change resiliency.

In addition to providing habitat for aquatic species, riparian areas provide shade, water, and upland habitat for many terrestrial species. Riparian habitats disproportionately contribute to regional species richness (Krosby et al. 2018). These areas have the potential to function as dispersal corridors for both terrestrial and aquatic species because they often span multiple climatic gradients (Krosby et al. 2018). Riparian corridors in forested areas can reduce the effects of climate exposure by providing refugia from increasing air and water temperatures

(Klausmeyer et al. 2011). Conservation strategies focusing on maintaining connectivity between various riparian habitats in the RCIS area have the potential to create future climate refugia for vulnerable species and maintain current species richness. The goals, objectives, and actions shown in Table 5-60 aim to protect, enhance, and restore present day habitat connectivity to create resiliency to projected climate changes.



California Essential Habitat Connectivity (CEHC) Project, Caltrans & CDFG (2019)
ACE, CDFW (2019)

Transportation Agency for Monterey County
Monterey County Regional Conservation Investment Strategy

FIGURE 5-33
Areas of Conservation Emphasis (ACE) Terrestrial Connectivity

Figure 5-33. Areas of Conservation Emphasis (ACE) Terrestrial Connectivity

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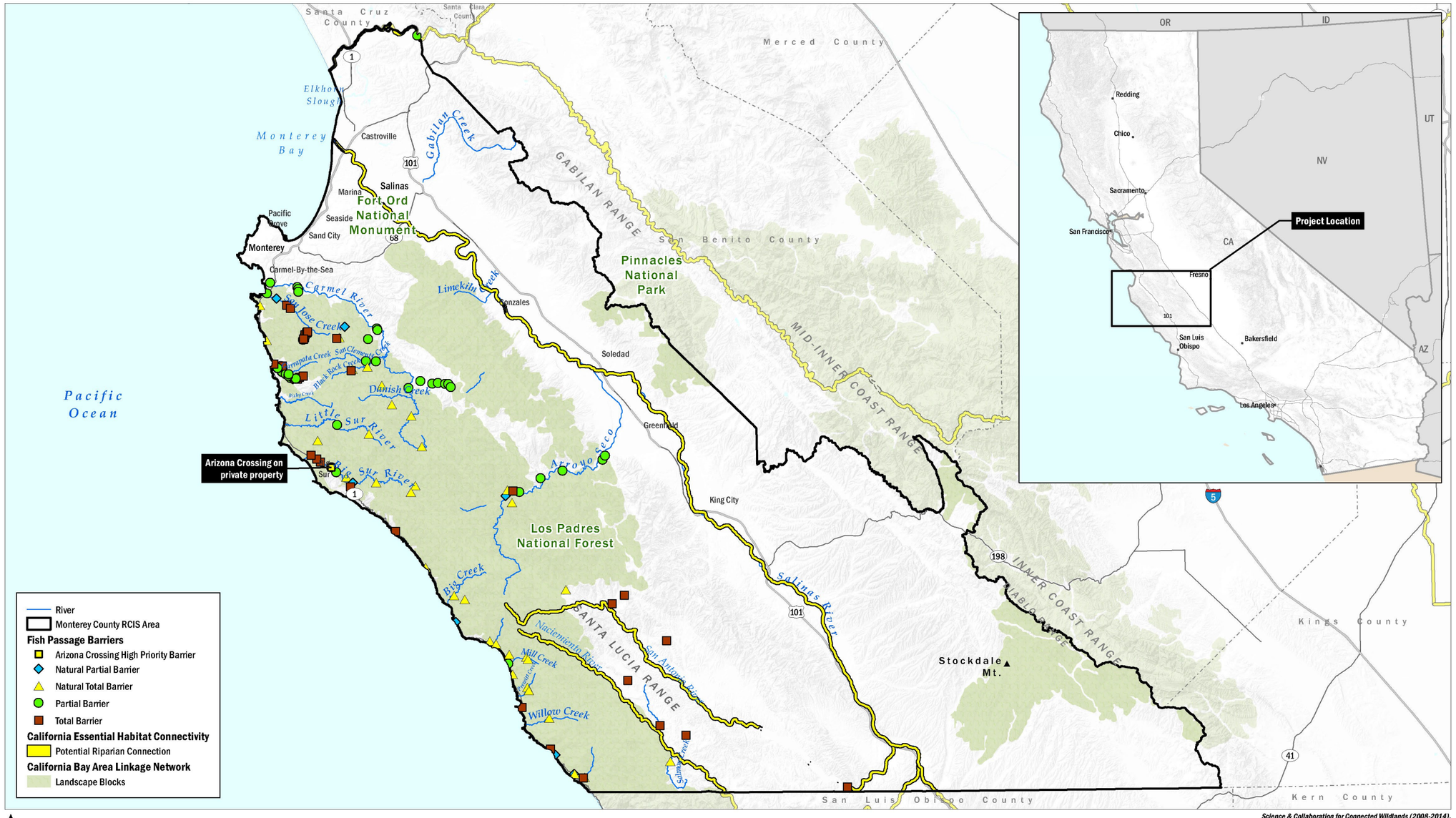

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FIGURE 5-34
Additional Aquatic and Terrestrial Connectivity

Figure 5-34. Additional Aquatic and Terrestrial Connectivity

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Habitat Connectivity Conservation Priorities, Goals, Objectives, and Actions

All RC and Water goals, objectives and actions apply to habitat connectivity (HC). Amphibian actions 1.2.2, 1.2.3, and 1.2.4 apply to habitat connectivity.

Species-specific actions that apply to habitat connectivity include:

- BUOW 1.2.1, 1.2.3, 1.3.1
- CACO 1.2.1, and 1.3.1
- CN 2.1.1
- CRLF 2.1.1
- CTS 1.1.1, 2.1.1
- MB 1.3.1
- ML 1.2.1, 1.2.2, 1.2.3, 1.3.3, 1.5.1,
- SCLTS Goal 2
- SJKF 1.1.1, 1.1.2, 1.2.3,
- SCCCS 1.2.1, 1.2.3, 1.3.1, 1.3.2, 1.3.3, 1.3.6,
- CSW 1.2.1
- Working Lands: 1.1.6

Table 5-60. summarizes specific goals, objectives, and actions for the habitat connectivity

Conservation Priorities

- Protect, enhance, and restore habitat along irreplaceable and important terrestrial corridors including:
  - Gabilan Range (including Pinnacles National Park)–Santa Cruz mountains corridor (CDFW 2019a)
  - Santa Lucia Range–Inner Coast Range corridor (Figure 5-33a) (CDFW 2019a)
  - Santa Lucia Range from Fort Ord south to the Carmel River, and further south to the Nacimiento River, Carmel River valley southeast to the Inner Coast Range, Monterey Bay dunes and Fort Ord southwest to Sierra de Salinas and Toro County Park, and southeast to the Carmel River area, and to Fort Ord and the coastal dunes of Monterey Bay (across Highway 68) (TAMC 2017)

- Install, repair, and improve infrastructure, such as culverts, undercrossings, overcrossings, bridges, directional fencing, scuppers, barrier breaks, roadside wildlife detection systems, drift fences, and wildlife tunnels, and remove existing barriers along linear infrastructure corridors, fire-break treatment, and agricultural and urban development, to promote wildlife movement (HC Action 1.2.1).
- Protect existing and intact aquatic and riparian habitat connectivity and linkages, and enhance and restore aquatic and riparian habitats, including removing and improving barriers to fish passage.

Table 5-60. Habitat Connectivity Goals, Objectives, and Actions

Goal	Objective	Threats	Co-Benefits	Action
HC Goal 1: Protect, establish, and improving habitat connectivity and linkages.	HC Objective 1.1: Protect known habitat corridors and linkages by protecting suitable habitat. Measure progress toward achieving this objective in the acres of habitat and adjacent/equivalent acres protected.	• Habitat loss, degradation, fragmentation	• Connectivity • Other focal/ non-focal species	RC Objective 1.1 (Protection) actions
HC Goal 1:	HC Objective 1.2: Establish and improve habitat connectivity. Measure progress toward achieving this objective in acres of corridor habitat protected and the number of barriers to movement modified, removed, or otherwise upgraded.	• Vehicle-impact mortality • Decreased habitat connectivity	• Connectivity • Other focal/ non-focal species • Intraspecific competition because of limited habitat	HC 1.2.1 Install, repair, and improve infrastructure (e.g., culverts, undercrossings, overcrossings, bridges, directional fencing, scuppers, barrier breaks, roadside wildlife detection systems, drift fences, wildlife tunnels) and remove existing barriers along linear infrastructure corridors, fire-break treatment, and agricultural and urban development, to promote wildlife movement.

Goal	Objective	Threats	Co-Benefits	Action
HC Goal 1:	HC Objective 1.2:	• Habitat loss, degradation, fragmentation	• Connectivity • Other focal/ non-focal species	HC 1.2.2 Conduct studies of species movement to identify areas to improve population connectivity.
HC Goal 1:	HC Objective 1.2:	• Vehicle-impact mortality	• Connectivity • Other focal/ non-focal species	HC 1.2.3: Work with transportation districts or others to collect and analyze roadkill data, to identify hotspots where wildlife interactions occur, to inform the location and design of wildlife crossing infrastructure improvements
HC Goal 1:	HC Objective 1.2:	• Habitat loss, degradation, fragmentation	• Connectivity	HC 1.2.4. Restore and enhance linkages between habitats required for all life stages (i.e., improve linkages between upland and breeding or foraging habitats).
HC Goal 1:	HC Objective 1.2:	• Habitat loss, degradation, fragmentation	• Connectivity	HC 1.2.5 Restore and enhance terrestrial habitat corridors and linkages between small and large landscape blocks.

Goal	Objective	Threats	Co-Benefits	Action
HC Goal 2: Improve aquatic and riparian connectivity throughout the RCIS area through protection, enhancement, and restoration	HC Objective 2.1: Improve freshwater aquatic and riparian connectivity in areas that link sensitive species and habitats. Measure progress toward achieving this objective by the improvement of aquatic conditions, water quality, and connectivity of aquatic and riparian resources.	• Habitat loss, degradation, fragmentation	• Connectivity	HC 2.1.1. Protect existing and intact aquatic and riparian habitat connectivity and linkages.
HC Goal 2:	HC Objective 2.1:	• Habitat loss, degradation, fragmentation	• Fish passage barriers	HC 2.1.2 Improve connectivity/remove barriers to fish passage throughout the RCIS area, by ground-truthing and monitoring assumed fish passage barriers.
HC Goal 2:	HC Objective 2.1:	• Habitat loss, degradation, fragmentation	• Connectivity	HC 2.1.3: Improve quality and connectivity of riparian habitats, focusing on temperature profiles and appropriate substrate, especially considering areas of expected climate change impacts and future range.

Sources: CDFW 2019a, TAMC 2017, Spencer et al. 2010