



# Fish and Wildlife Connectivity on the California State Highway System



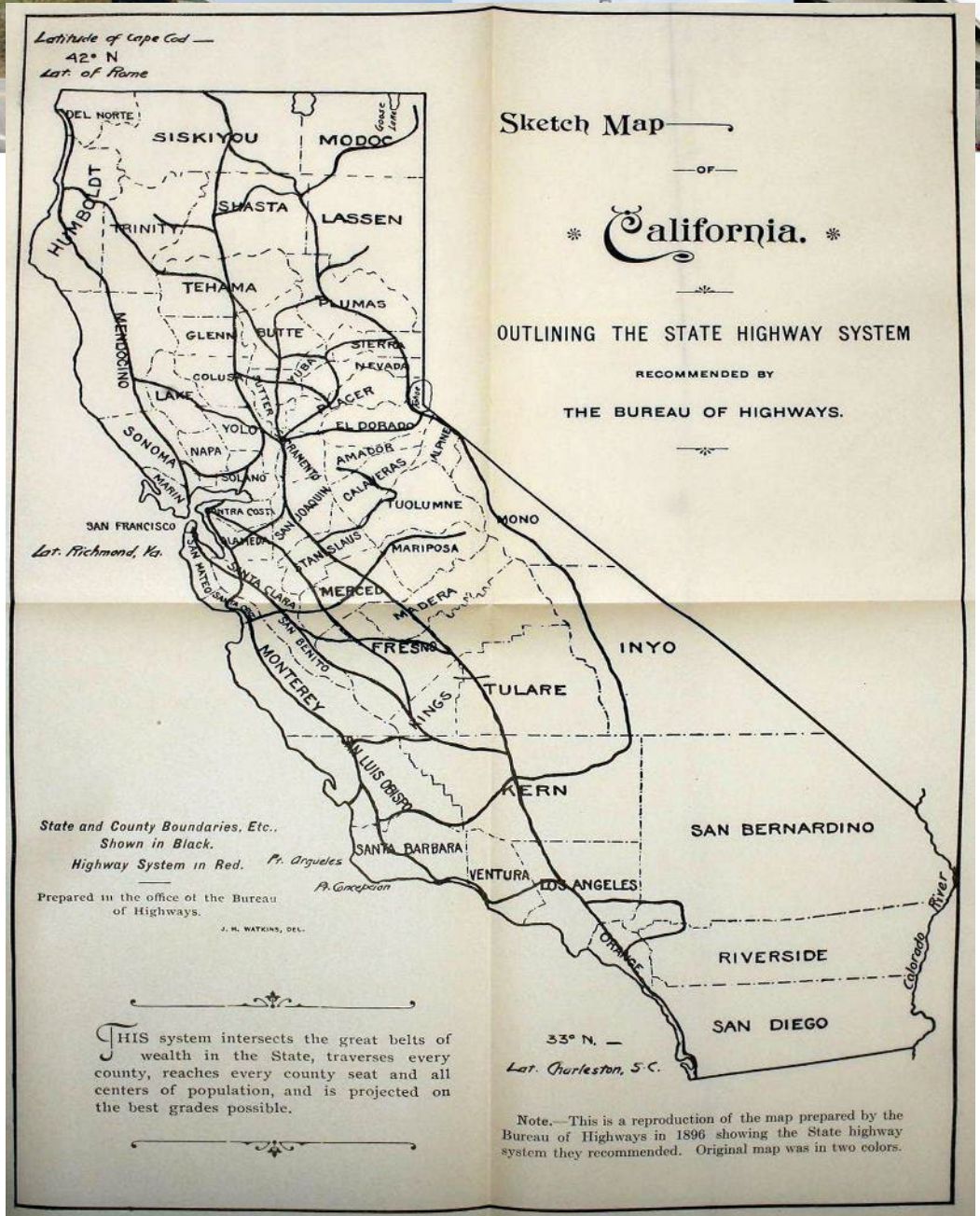
## Reminders

- Webinar is being recorded
- All attendees automatically muted upon entry
- Chat box deactivated for duration of meeting
- Opportunity to comment/ask questions during facilitated Q&A session
  - ***Participation inactive until Q&A session begins. Instructions will be displayed onscreen***
    - Type questions/comments into Q&A box



# Bureau of Highways

- In 1895 CA Legislature created the Bureau of Highways, in part due to pressure from the League of American Wheelman (bicyclists).
- Bureau of Highways recommended a system of 28 state routes, which closely correspond to our current system.





**1896** - Roads built for horses, carriages and footpaths.

**1907** - San Francisco held an auto show and transportation in CA was forever changed.





# Legacy Fish and Wildlife Barriers

1970 - NEPA signed into law and CEQA was enacted.  
Majority of SHS was constructed **pre – 1966.**



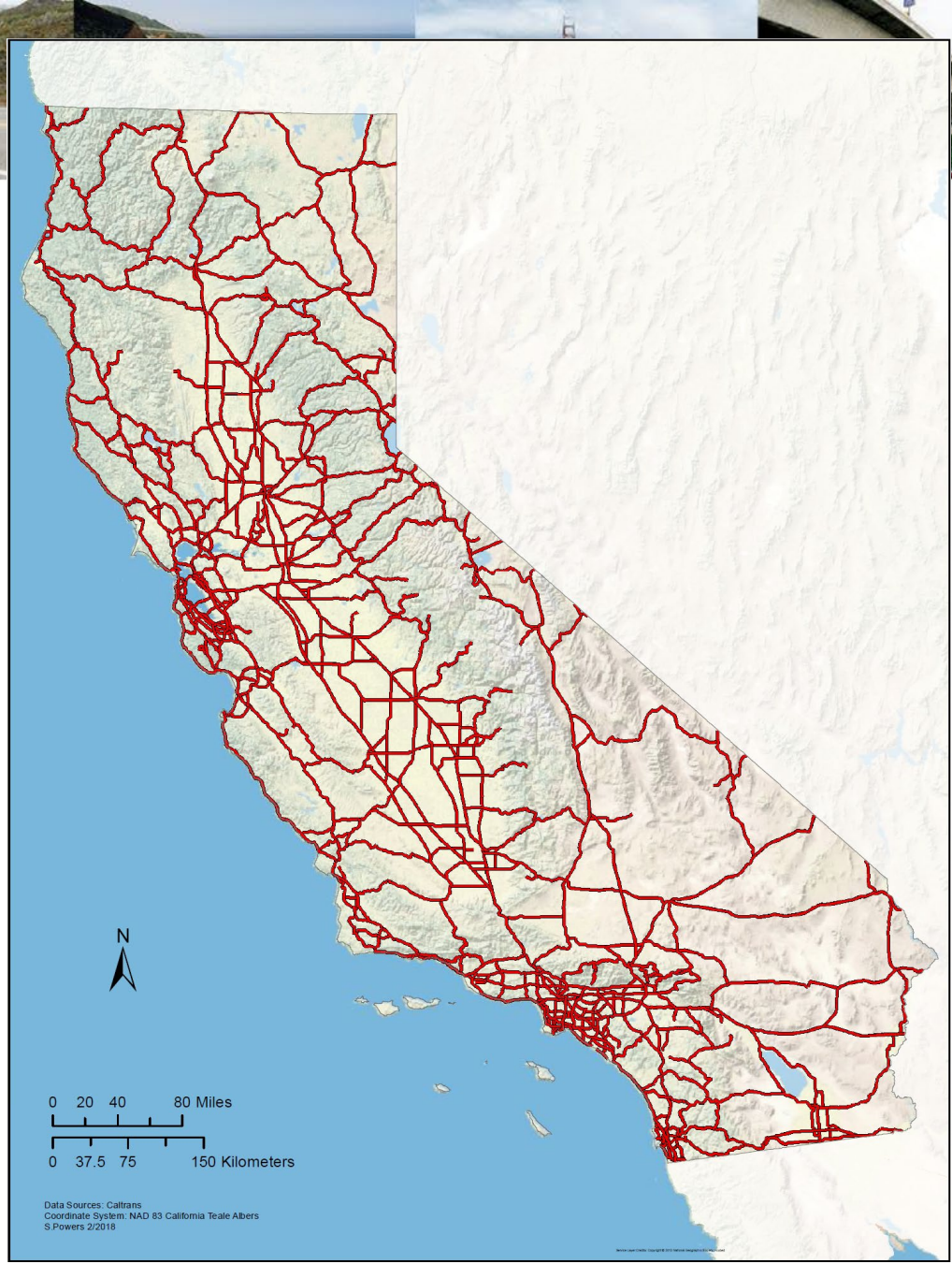
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1956 - Interstate 680, Danville



1970 - First High Occupancy Vehicle lanes opened





# State Highway System

- ~ **15,181 miles** of State Highway
  - Longest Route – Hwy 101, El Camino Real/Redwood Highway – 807 miles
  - Highest Summit – Route 20 Tioga Pass – 9,945 ft
- ~**9%** of roads in CA State Highway System
  - 78% County and City roads
  - 13% Private





## Streets & Highways Code, Section 156 (SB 857, 2006)

- Prohibits actions that extend the service life of a road/stream barrier to salmon or steelhead.
- Projects may not create new barriers.
- Report annual progress to Legislature;
  - **Assessment** of road/stream crossings,
  - **Prioritize** barriers to species for recovery,
  - **Active** projects in delivery,
  - **Funding** for current/planned projects, and
  - **Completed** remediations.





## Streets & Highways Code, Section 158 Barriers to Wildlife Movement (AB 2344, 2022)

- Projects may not create new barriers.
- Requires partnerships with California Department of Fish and Wildlife, other state, federal, local partners, and the public.
- Report biennial progress to Legislature:
  - **Assessments** of barriers to wildlife.
  - **Prioritize** barriers for species recovery and animal/vehicle hot spots,
  - **Funding** for current and planned projects, and
  - **Completed** remediation locations.







# Wildlife Connectivity Program Report – July 2024

- SHC 158.1 (c), required Caltrans to publish a list of funded transportation projects that are being developed to remediate barriers to wildlife connectivity.
- The inventory of Active (funded), Planned (pre-funding), and Priority barrier locations (unfunded) are identified in the report.



## Caltrans Wildlife Connectivity Program Report



Photo: Highway 17, Laurel Curve (District 5)

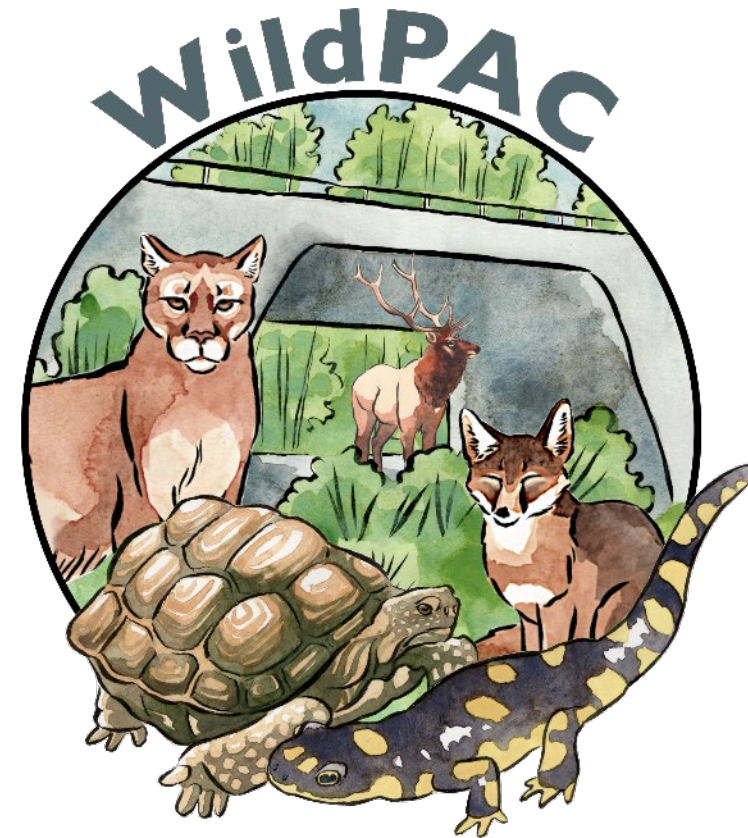
California Department of Transportation  
Headquarters Division of Environmental Analysis  
Office of Fish and Wildlife Connectivity

July 1, 2024



## Streets & Highways Code, Section 158 (cont.)

- **July 1, 2025** - Update wildlife connectivity design guidance (Highway Design Manual).
- **July 1, 2028** - The department shall submit a report to the relevant policy committees and the budget committees of the Legislature, in compliance with Section 9795 of the Government Code, on the implementation of this article.
- Develop Wildlife Passage Advisory Committee (WildPAC) Partnerships with CDFW and other state, federal, and local partners to share science and data, prioritize barriers, funding and delivery support.

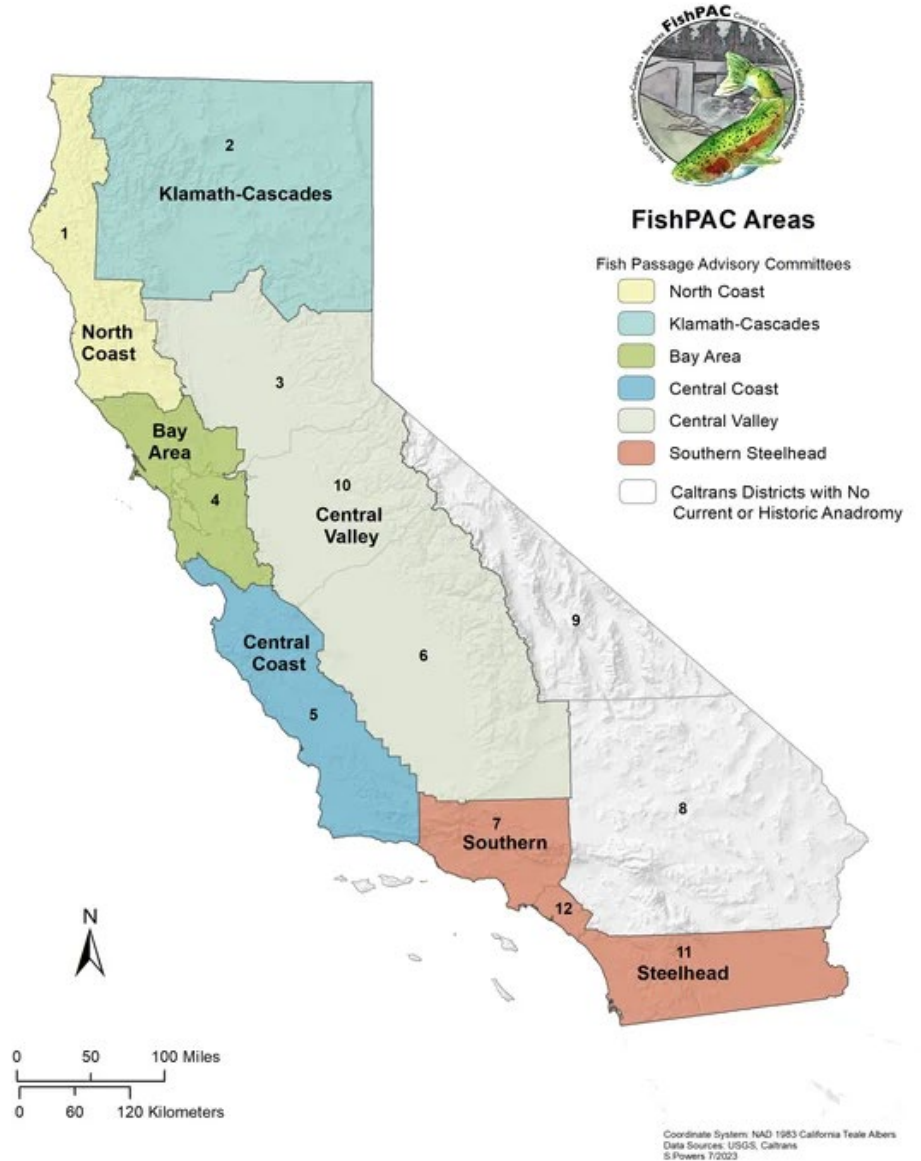




# Fish Passage Advisory Committees

Over **200** FishPAC members, to include **18** state, federal, and local partner agencies:

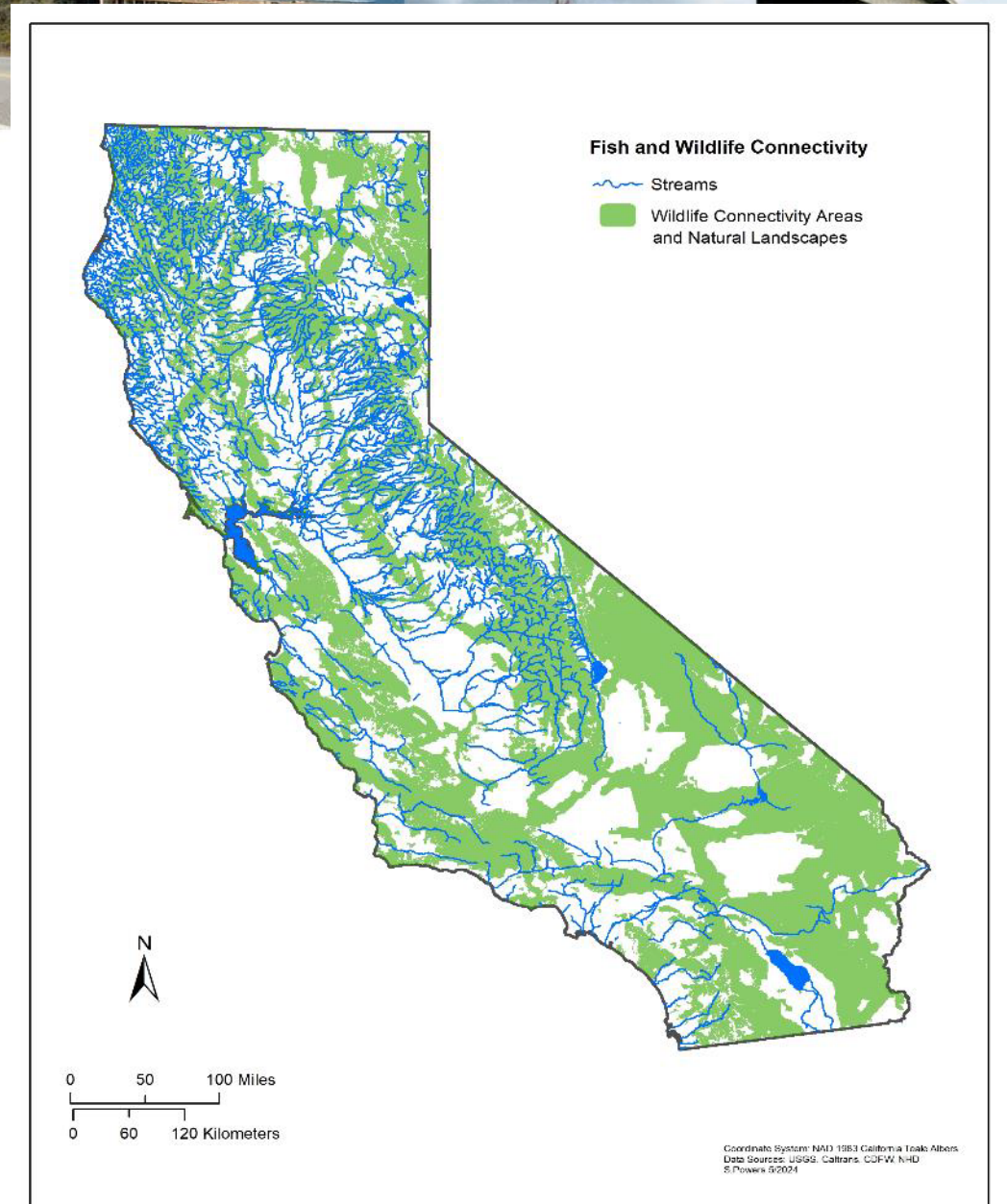
- D1 – North Coast (2003)
- D2 – Klamath-Cascades (2007)
- D4 – Bay Area (2016)
- D5 – Central Coast (2017)
- D7, D11, D12 – Southern Steelhead (2017)
- D3, D6, D10 – Central Valley (2018)
- Interagency Engineering Working Group (2015)
- Leadership Action Team (Jan 2020)
- Science and Innovation Team (Oct 2020)





# Landscape Analysis for Fish and Wildlife Movement

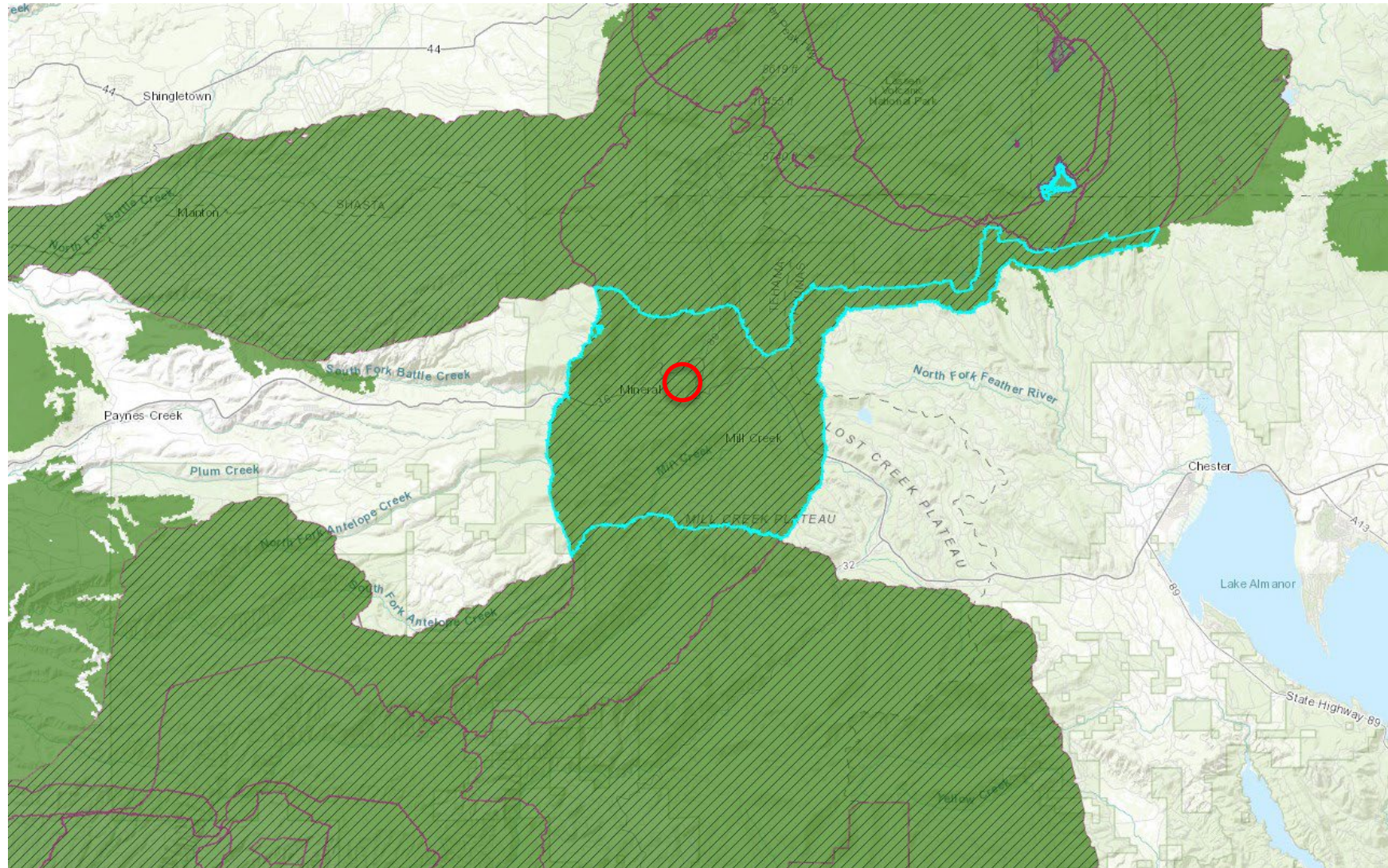
- Natural landscape features include mountain draws, creeks, desert washes and other features that provide wildlife movement opportunities across suitable habitat areas.
- Watersheds including rivers, streams, and riparian areas are protected corridors between green landscapes, allowing movement pathways for fishes, other aquatic species, and terrestrial wildlife.





**Using remote sensing to  
identify habitat  
connectivity  
opportunities**











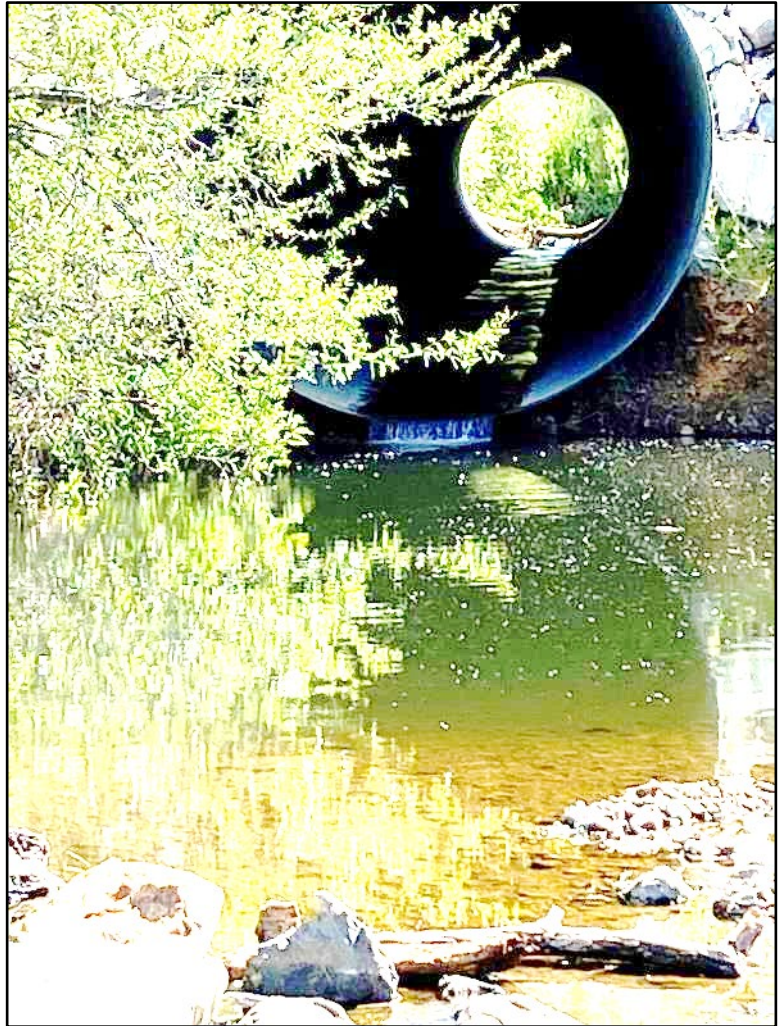


**Location: Mariposa 132, Piney Creek**

**Species:** Foothill yellow-legged frog, western pond turtle, American badger, black bear, bobcat, coyote, mule deer, mountain lion













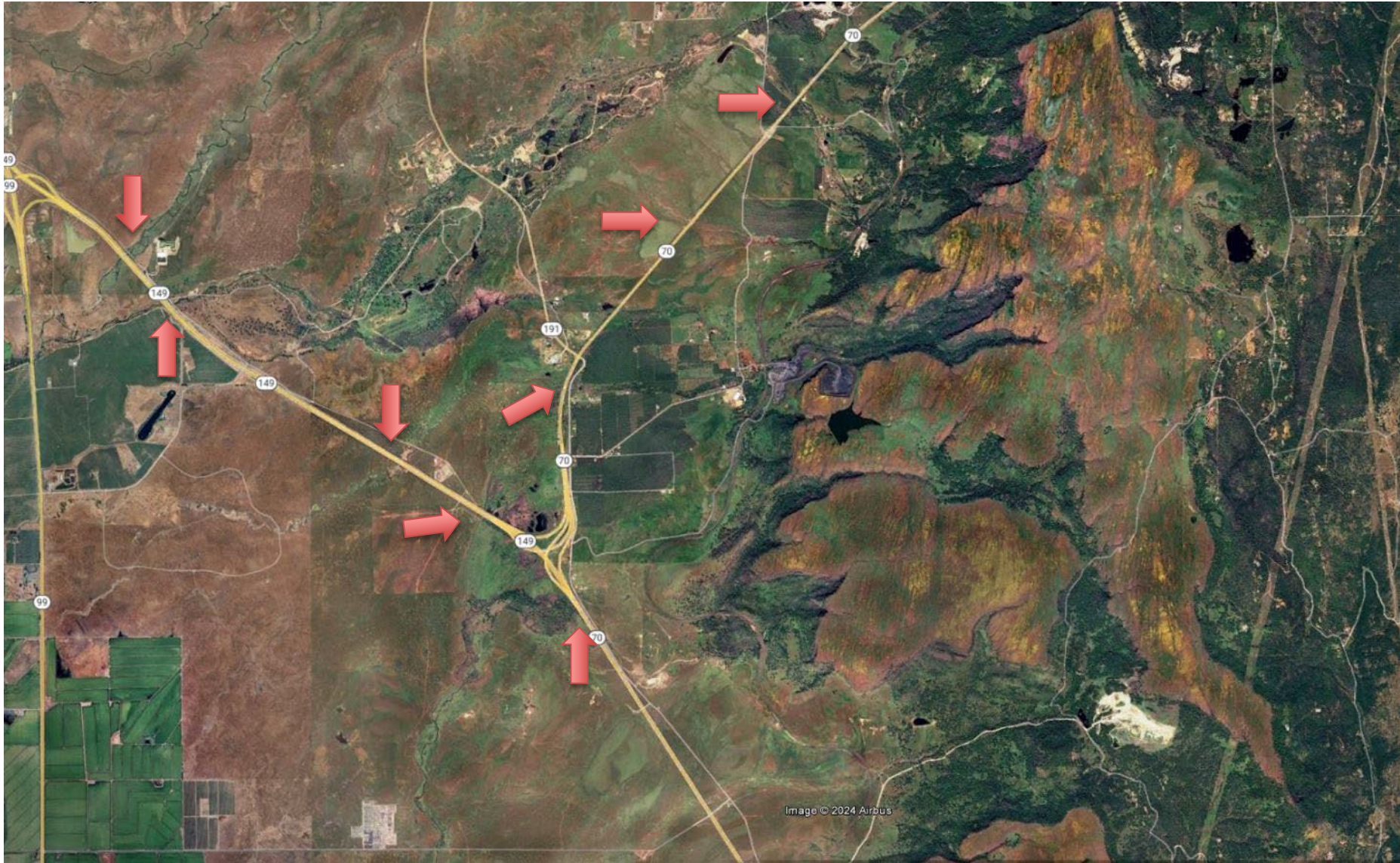
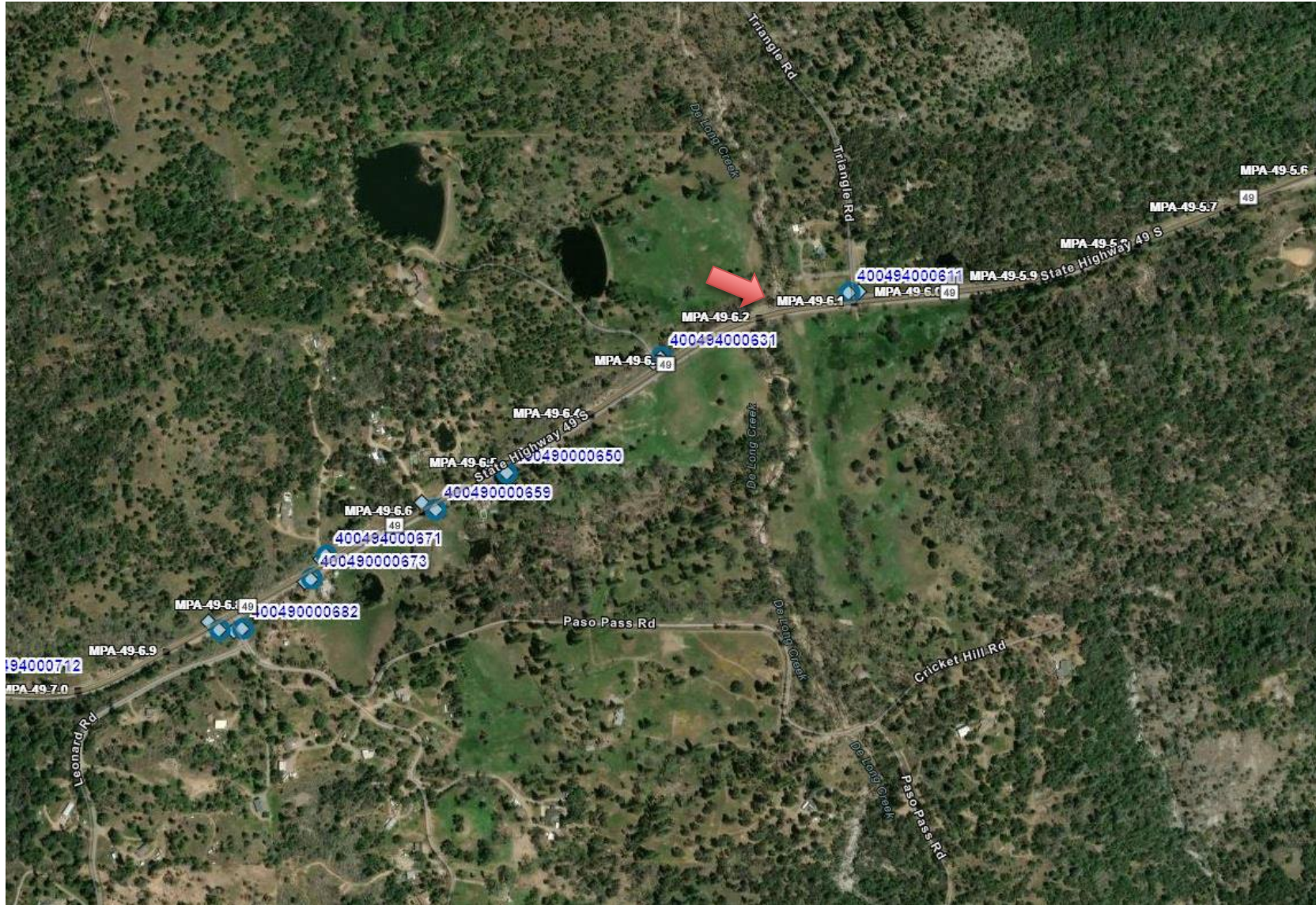


Image © 2024 Airbus







**Location:** Mariposa 49, De Long Creek



**Species:** Fisher - S. Sierra Nevada, Foothill yellow-legged frog, Sierra Nevada yellow-legged frog, CA tiger salamander, Yosemite toad, Northwestern pond turtle, Badger, Black Bear, Bobcat, Coyote, Deer, Mountain lion





## Wildlife Connectivity Barrier Science and Data

- Remote sensing
- Camera studies
- Collar tracking data
- Threatened and endangered species occurrence
- Animal vehicle hot spots
- Corridor studies
- Identified facility deficiencies





## Small Bodied Wildlife





# Wildlife Camera Studies Demonstrate Refusal and Use





# GPS Collar Data – Roosevelt Elk

CDFW and Redwood National Park

Collar data demonstrates Hwy 101 elk barrier

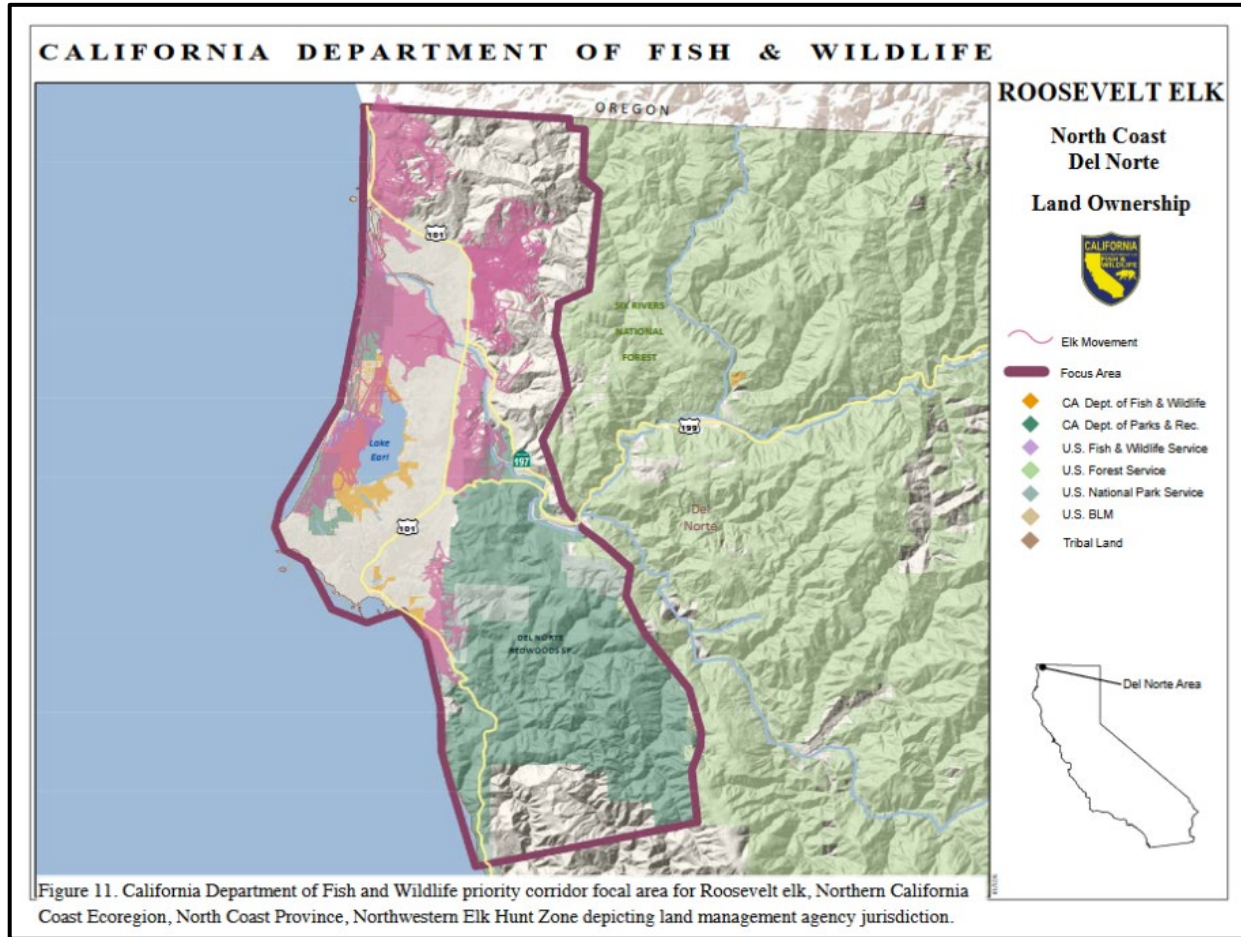


Figure 11. California Department of Fish and Wildlife priority corridor focal area for Roosevelt elk, Northern California Coast Ecoregion, North Coast Province, Northwestern Elk Hunt Zone depicting land management agency jurisdiction.





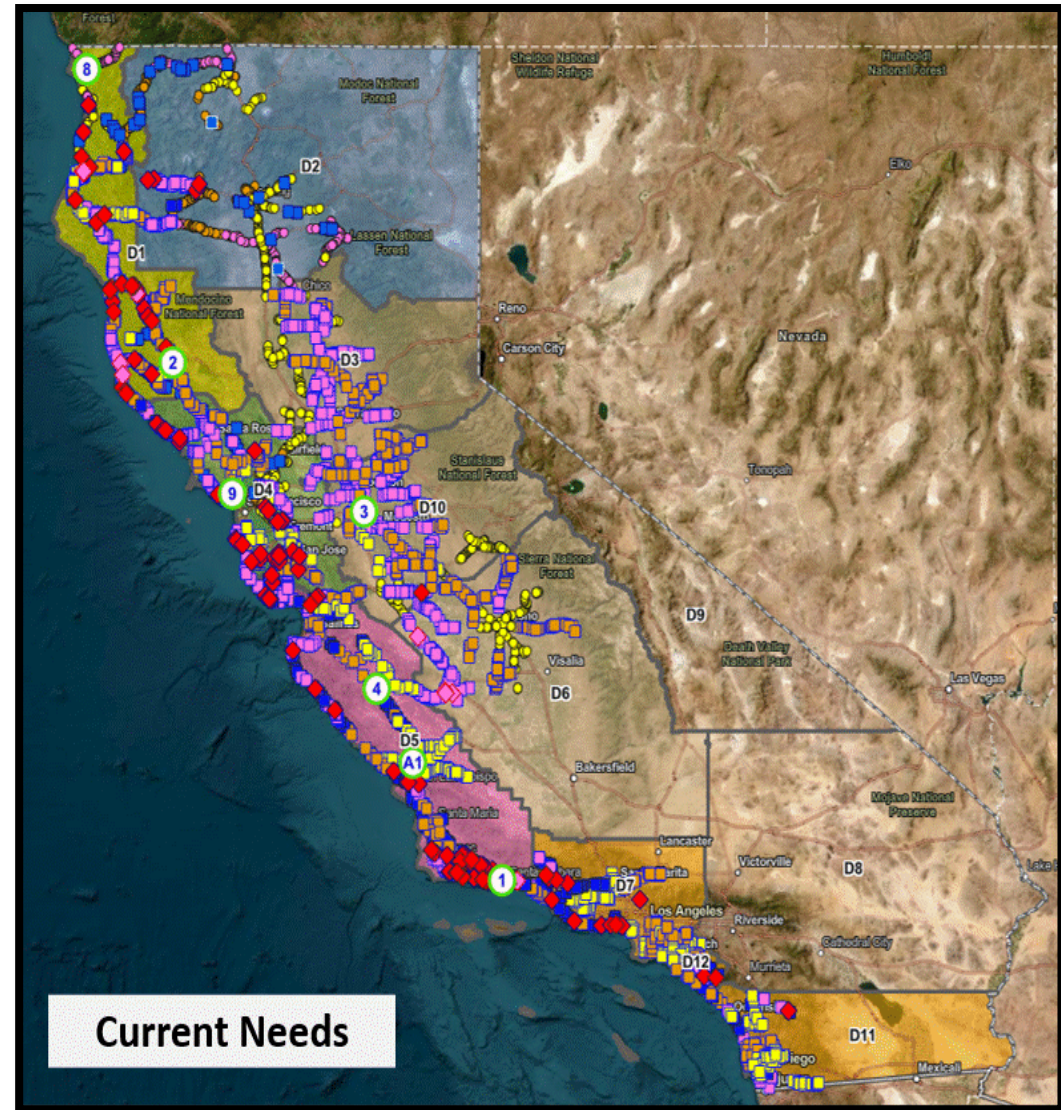
**Hot Spot Analysis -  
Identifying areas with  
Animal-Vehicle Collisions**





# Assessment Partnership

- Caltrans and CA Conservation Corps Fish Passage Assessment Partnership.
- **73%** of total preliminary Fish Passage assessment needs completed (2020 to present).
  - ~ 4,000 field assessments completed







# Pilot Wildlife Connectivity Permeability Assessments

Reconnaissance level assessment of facilities within priority connectivity route segments. Collect baseline photos and data to aid in location evaluation.

- Photos of SHS facility and landscape feature.
- Basic location and facility information.

Wildlife Connectivity Permeability Assessment (1st Pass)

▼ Location Information

WC ID:  
(if known)  
81785

County: \*  
Monterey

Route: \*  
1

PM:  
18.91

Location/Stream Name:  
Kirk Creek

► Survey Information

▼ Site Information

► GPS Data

► Landscape Feature Questions

► Facility Details

► Photos

► Detailed Assessment Requirement

► Additional Notes

For questions or help contact:  
[Caltrans Survey Administrators](#)

► QA/QC

Logos for Caltrans, CCC, and a wildlife logo are visible at the bottom of the form.





## Caltrans Wildlife Connectivity Barriers

Purpose of this tool

Active (funded)

Planned Locations

Priorities Unfunded

Caltrans has 75 Priority locations as determined by District reporting and based on years of the twelve Caltrans Districts collaborating with partners within their geographic regions, to include CDFW, U.S. FWS, as well as other state, federal, and local partners. Priority locations have been identified for threatened and endangered species, animal/vehicle hotspot areas, locations identified in the California Essential Habitat Connectivity layer, or areas within CDFW's Priority report, as well as other state, federal, or local protected lands.

- 1** Priority Case ID: 20220101  
Palmer Creek  
Humboldt 101, PM 62.23

Details
- 2** Priority Case ID: 20220102  
May Creek - RNP  
Humboldt 101, PM R126.22

Details
- 3** Priority Case ID: 20240102  
Willow Creek  
Humboldt 299, PM 31.07

Details
- 4** Priority Case ID: 20240103  
Gasker Slough, Hathaway Creek  
Mendocino 1, PM 17.67

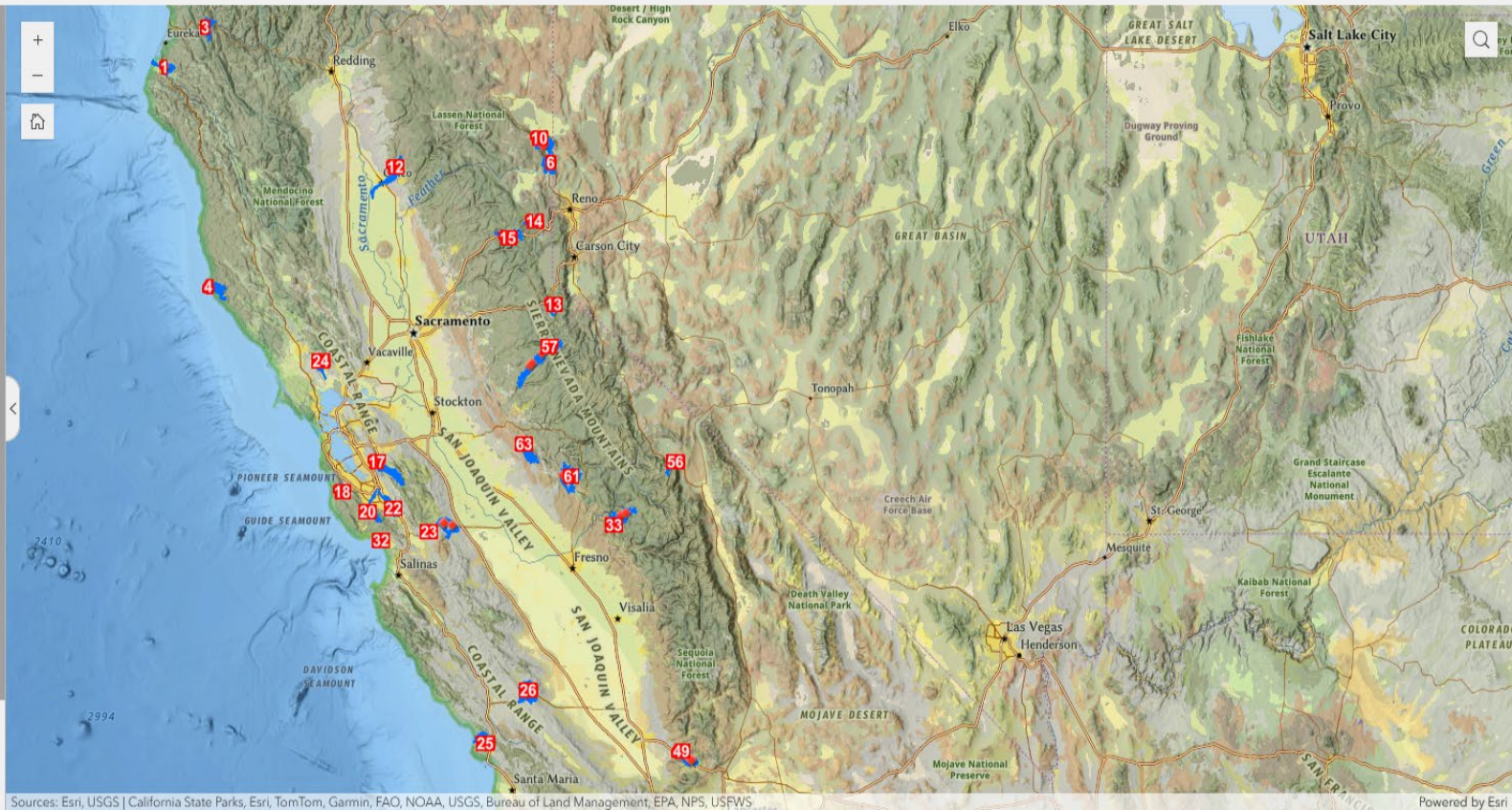
Details
- 5** Priority Case ID: 20220103  
Big Navarro - Garcia Bridge  
Mendocino 1, PM 180.5

Details
- 6** Priority Case ID: 20240204  
Red Rock, Long Valley Creek  
Lassen 395, PM 12.35

Details
- 7** Priority Case ID: 20240205  
Upper Long Valley Creek  
Lassen 395, PM 13.12

Details
- 8** Priority Case ID: 20240206  
Red Rock Canyon  
Lassen 395, PM 14.25

Details



<https://experience.arcgis.com/experience/edae9084a7594501aa86fd52e8fb8866>



# Caltrans Wildlife Connectivity Priority



**Mono 395, Convict Creek**

**Species:** Deer hotspot





## Caltrans Wildlife Connectivity Priority (cont.)



**Mono 395, Convict Creek**



**Species:** Owens pupfish, Fisher, Sierra Nevada Red Fox, Greater Sage grouse, Round Valley deer



# Caltrans Wildlife Connectivity Priority



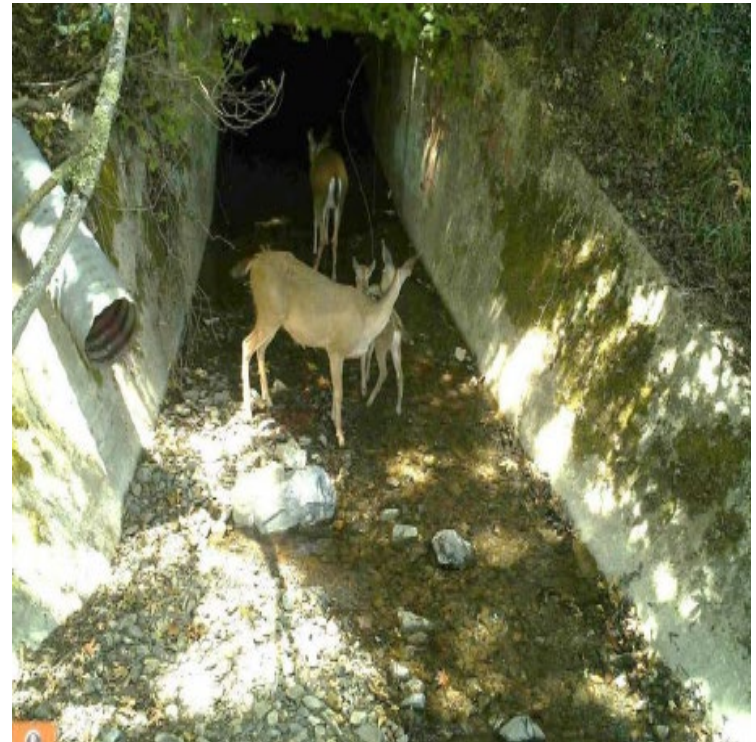
**Placer 80, Rainbow Troy**

**Species:** Gray Wolf, Loyalton Truckee Mule Deer



**Nevada 89, Sagehen Creek**

**Species:** Lahontan cutthroat trout, Sierra Nevada yellow-legged frog, Loyalton Truckee mule deer

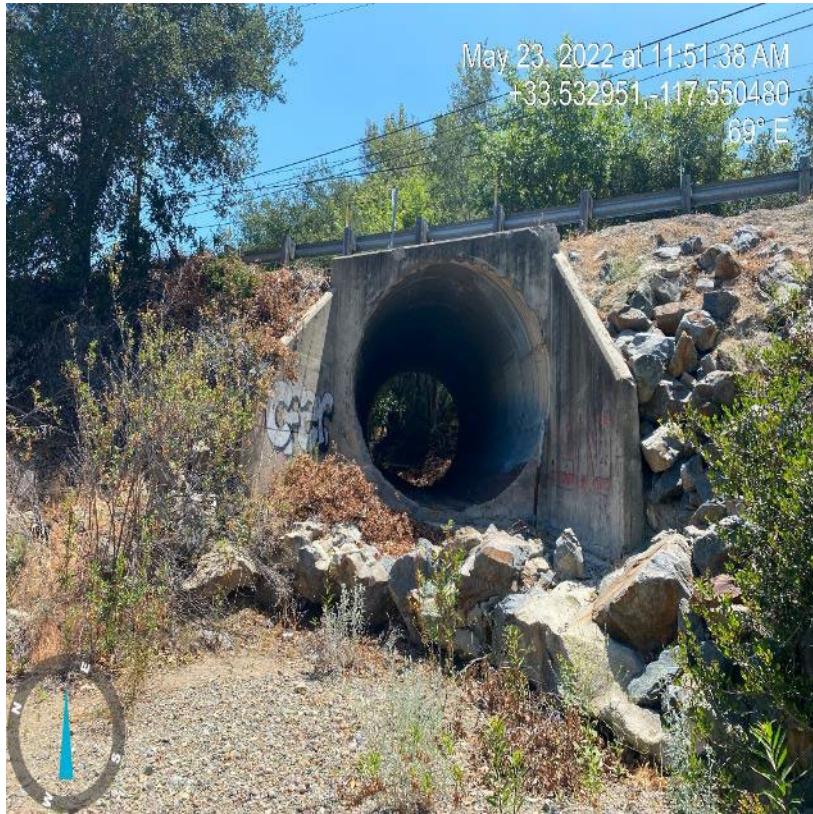


**Santa Clara 17, Los Gatos Creek**

**Species:** CA red-legged frog, Mountain lion.



# Caltrans Wildlife Connectivity Priority



**Orange 74, Ortega**

**Species:** Arroyo toad mountain lion.



**Merced 152, Pacheco Pass**

**Species:** CA Red-legged frog, San Luis Reservoir Tule Elk



**Mariposa 49, Bootjack**

**Species:** Fisher, CA red-legged frog, Mule deer, Mountain lion



# Caltrans Wildlife Connectivity Priority



**Los Angeles 118, Santa Susana Pass**

**Species:** Mountain lion

**Ventura 101, Conejo Grade**

**Species:** Mountain lion

**Fresno 169, Shaver Lake**

**Species:** Sierra Nevada Fisher, Foothill yellow-legged frog, wolverine, San Joaquin mule deer



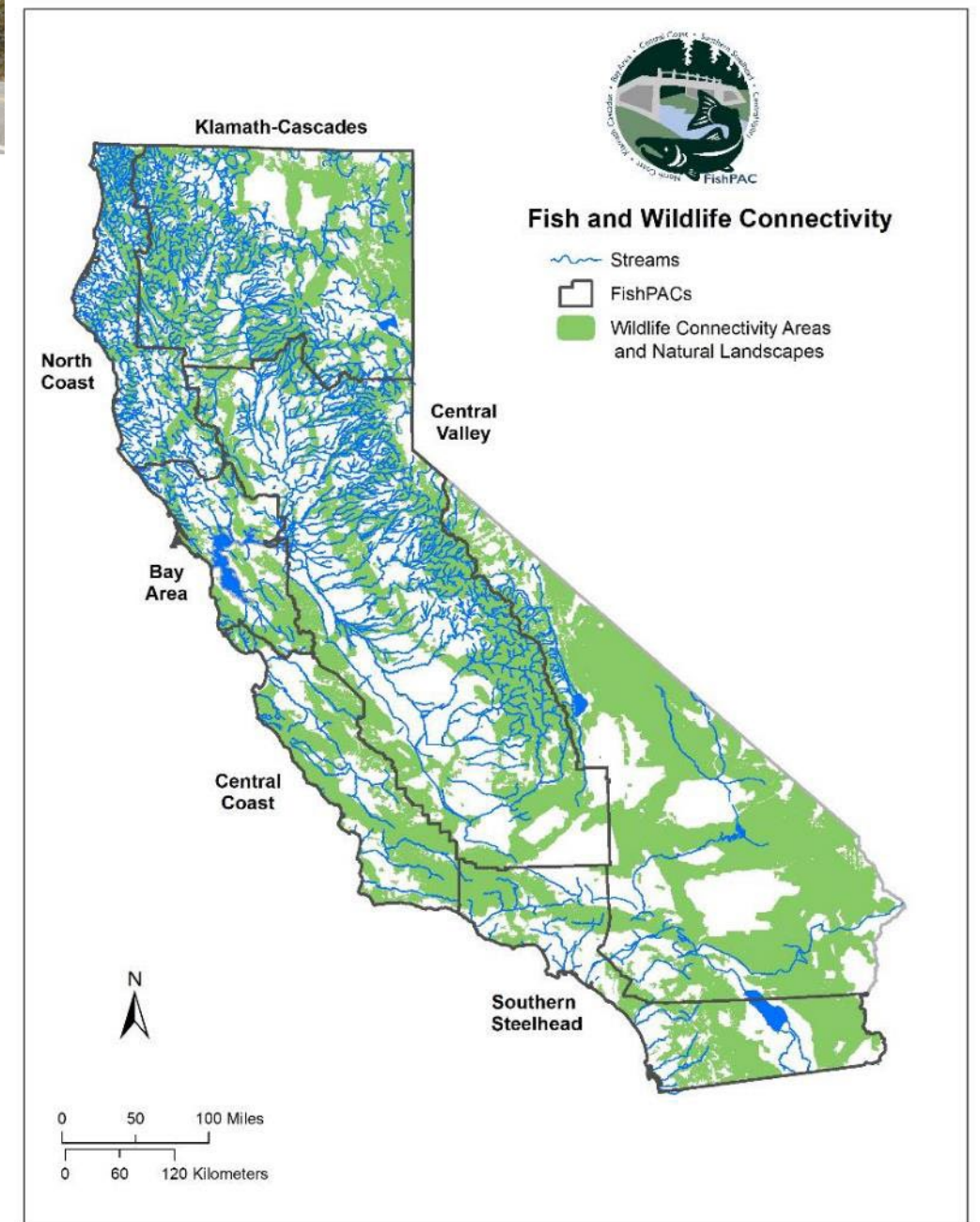


## Priority FWC SHOPP Inventory

**222** – Total fish and wildlife priority locations

- **90** - Wildlife Connectivity Priorities
  - **9** – Active (funded) and planned priority locations
    - (3) Cave, Soda, Clark Mountain - **~\$99M**
    - Meeks Creek - **~\$25.1M**
    - SR 97 Elk OC- **~\$18.1M**
  - **81** – Unfunded Priorities
- **132** – Fish Passage Priorities
  - **45** – Active (funded) and planned priority locations
  - **87** – Unfunded Priorities

Current Program investment - **~\$790M**







# Little Lost Man Creek, Humboldt 101



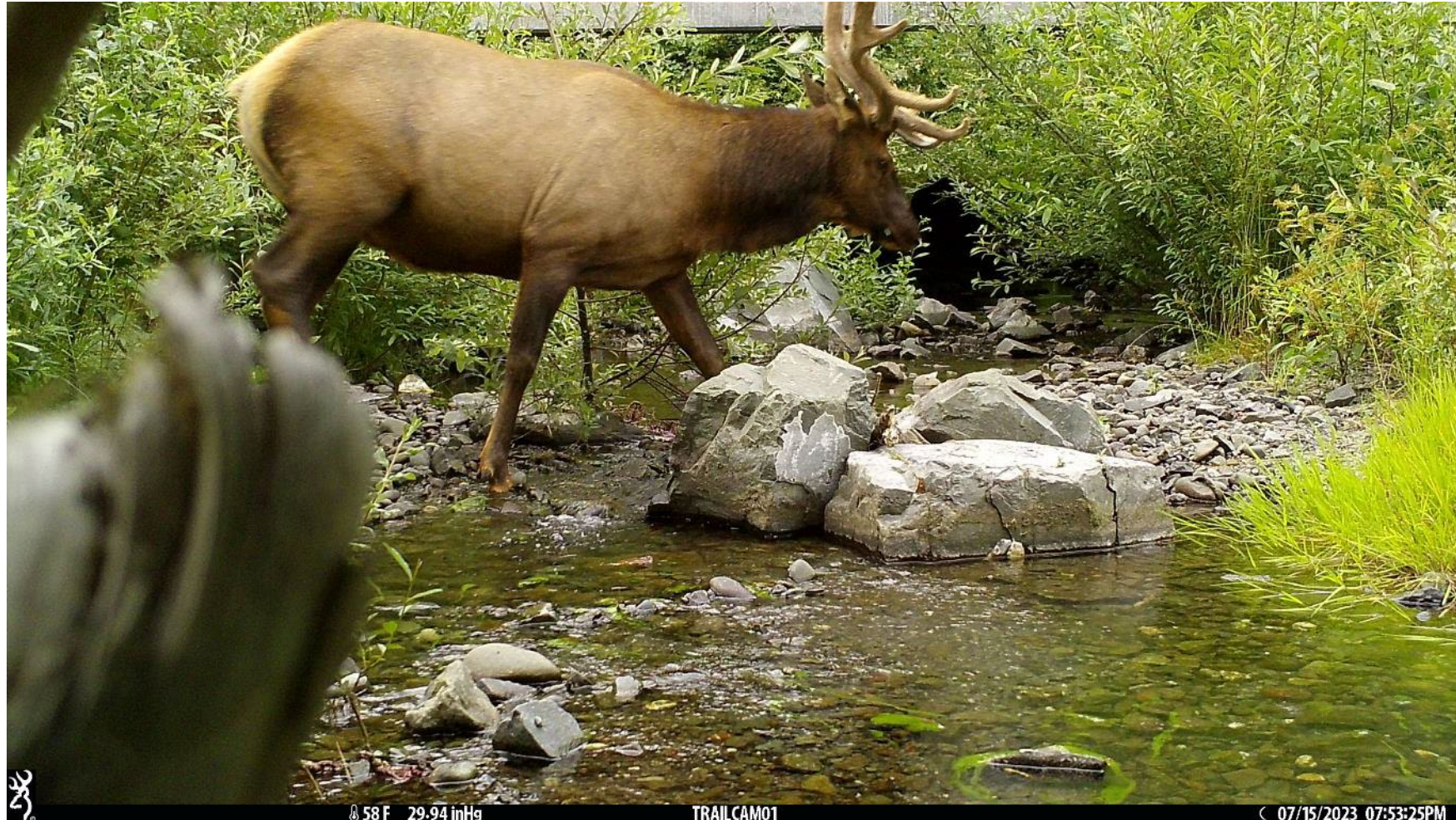


# Post Project Wildlife Camera Study (Little Lost Man)



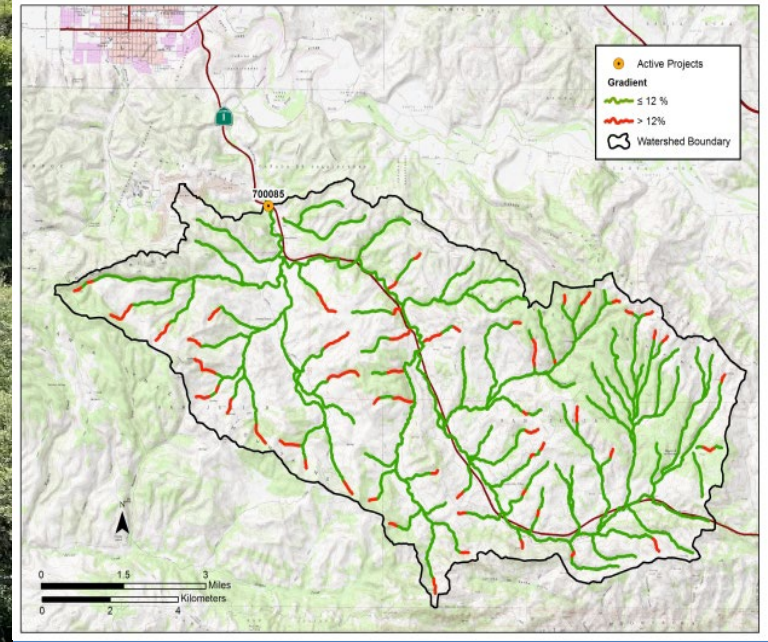


# Post Project Wildlife Camera Study (Little Lost Man)





# Salsipuedes Creek – Santa Barbara 1



<b>Species</b>	<b>Southern California Coast Steelhead (Endangered), other aquatic and terrestrial species.</b>
<b>Habitat</b>	Improved access to an estimated <u>101.81 miles</u> of upstream habitat for steelhead, and <u>30,925.65</u> watershed acres.



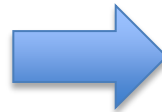
# Salsipuedes Creek Multi-Species Camera Study



Mountain lion

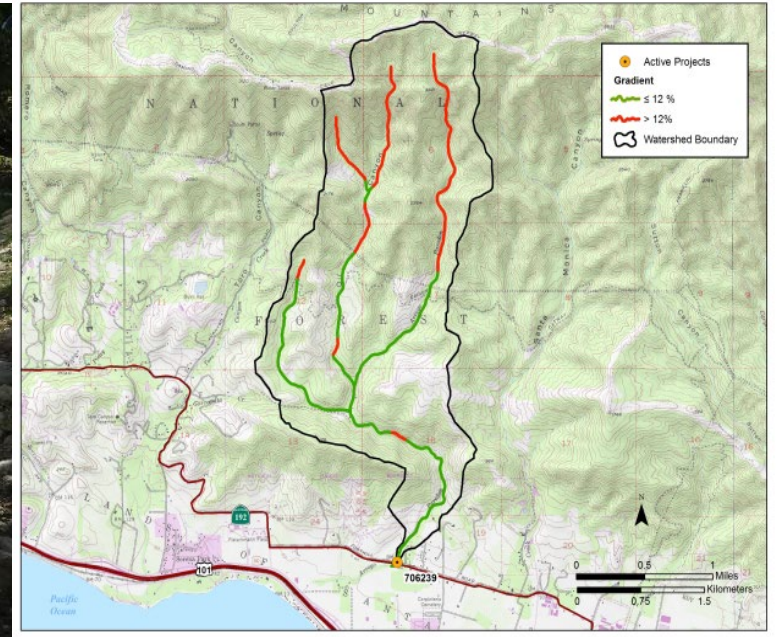


Fox





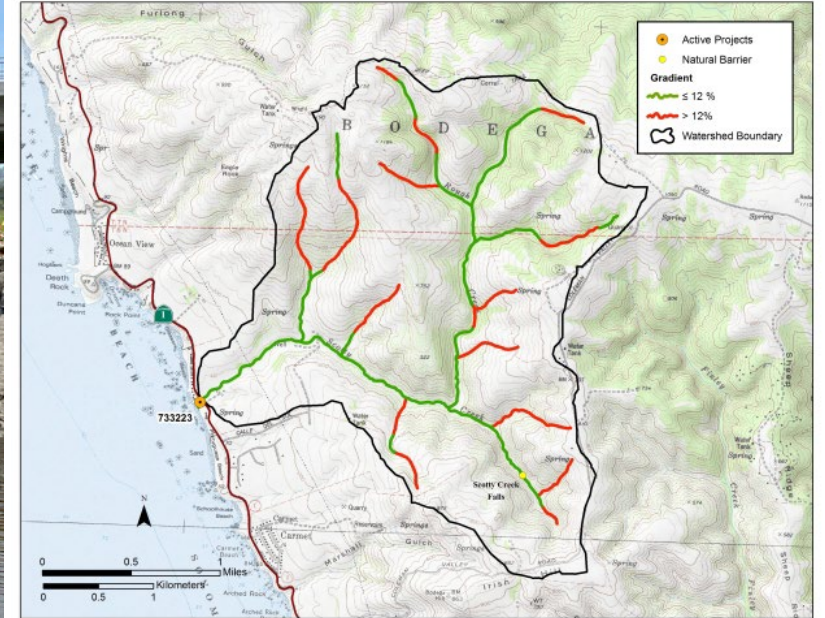
# Arroyo Paredon Creek – Santa Barbara 192



Species	Southern California Coast Steelhead (Endangered), other aquatic and terrestrial species.
Habitat	Improved access to an estimated <u>1.2 miles</u> of upstream habitat for salmon, and <u>2,322.75</u> acres of watershed area.



# Scotty Creek – Sonoma 1



<p><b>Species</b></p>	<p>Central California Coast Steelhead Trout (Threatened), Central California Coast Coho (Endangered).</p>
<p><b>Habitat</b></p>	<p>Improved access to an estimated <u>3.87 miles</u> of upstream habitat.</p>





## Scotty Creek (Gleason Beach) – Sonoma 1 (cont.)







## Scotty Creek (Gleason Beach) – Sonoma 1 (cont.)





## Fish Creek, Humboldt 254



**Species:** Steelhead Trout, Coho Salmon, Chinook Salmon, Foothill yellow-legged frog, Fisher, Pacific marten, Black bear, Bobcat, Coyote, Deer, Grey fox, Mountain lion



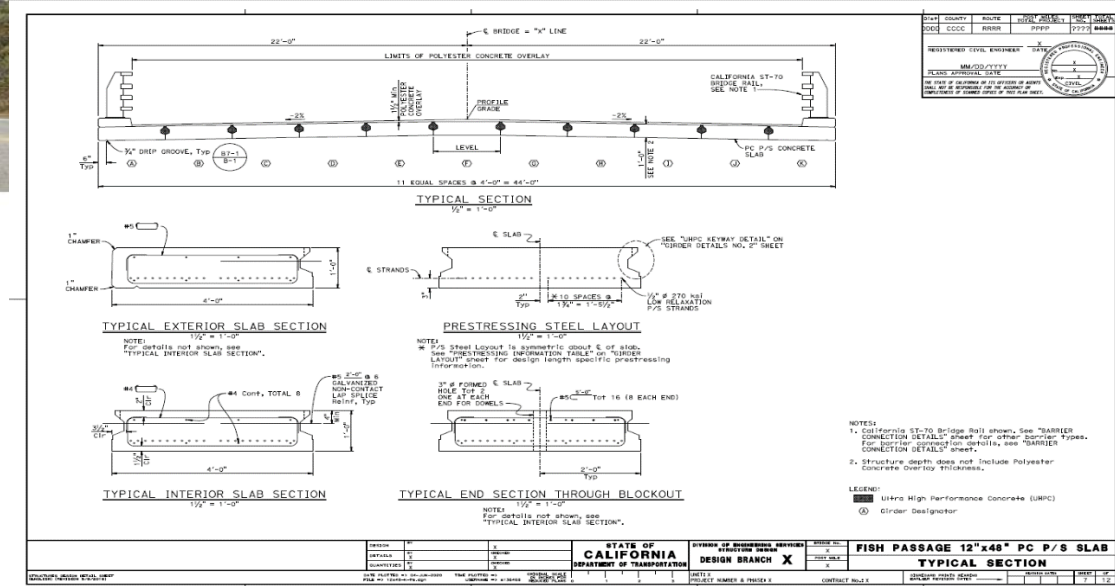
## Fish Creek – Humboldt 254, PM 4.18 (cont.)





# Fish and Wildlife Engineering

- ABC Bridges - pre-designed (65%), long-term, full-span fish and wildlife designs.
  - Long-term fish and wildlife solutions (75 - 100 years),
  - 20 to 120-ft bridges/viaducts,
  - Abutments can skew up to 45 degrees to match stream or landscape feature alignment,
  - Reduce long-term maintenance
- Caltrans funds CDFW and NMFS Senior Fish and Wildlife Engineers.





In 2024 the USDOT Federal Highways Administration recognized Caltrans' Fish Passage Program and FishPAC with an Environmental Excellence award.

**Caltrans Fish Passage Program**

**Caltrans**  
**California Department of Fish and Wildlife**  
**National Marine Fisheries Service (NOAA)**  
**California State Polytechnic University, Humboldt**

In cooperation with

Pacific States Marine Fisheries Commission, California Conservation Corps, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, California Coastal Commission, California State Water Board, California Coastal Conservancy, County of Marin, County of Santa Cruz, Santa Monica Resource Conservation District, South Coast Habitat Restoration, CalTrout, Trout Unlimited, Hoopa Tribal Fisheries, Karuk Tribe

*Gloria M. Shepherd*  
 Gloria M. Shepherd, FHWA Executive Director

May 28, 2024

U.S. Department of Transportation  
 Federal Highway Administration





**Juan Torres, Senior Environmental Scientist (Supervisor)  
Wildlife Connectivity Program**

# Mission Statement Wildlife Connectivity Program



**Objective:** Improve wildlife connectivity and roadway safety across California using the best available science



**Wildlife as defined by FGC § 89.5:** “‘Wildlife’ means and includes all wild animals, birds, plants, fish, amphibians, reptiles, and related ecological communities, including the habitat upon which the wildlife depends for its continued viability”



Photo Credits: Jason Bill and Sara Holm

Source: [Wildlife Crossing Project to Close U.S. 395 through Sonora Junction for Two Weeks | Caltrans](#)

# Wildlife Connectivity Team Members

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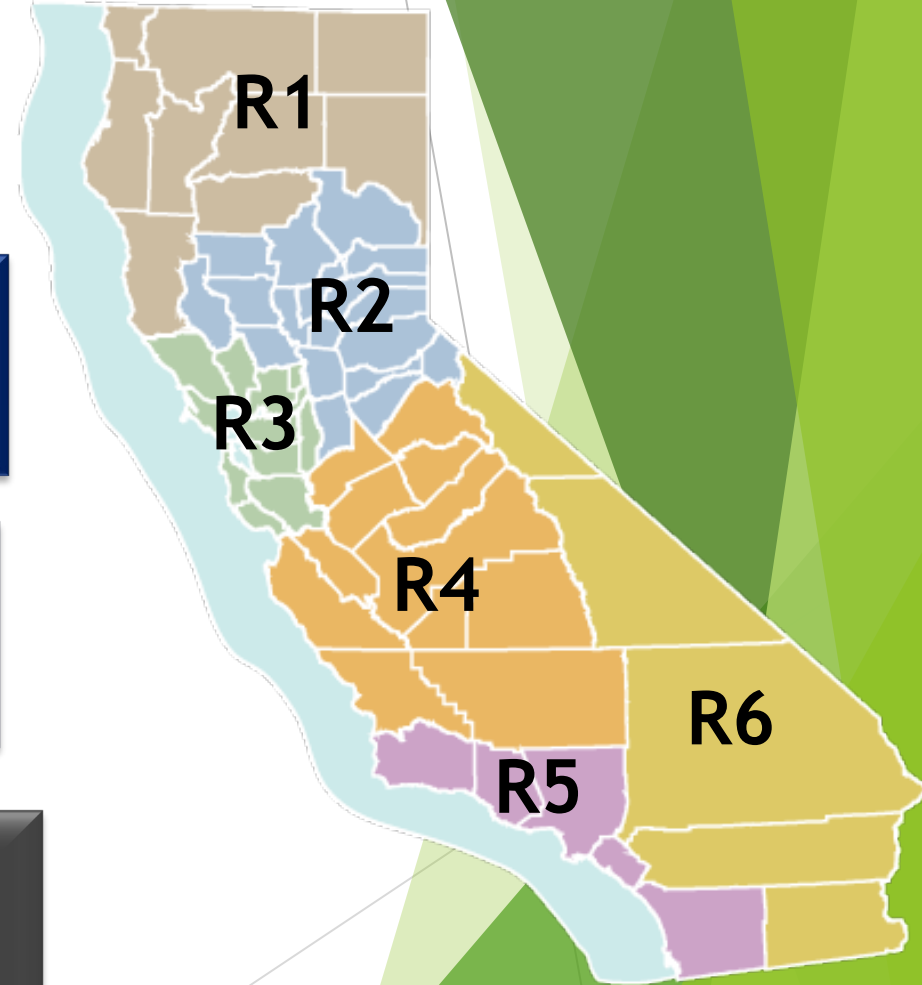
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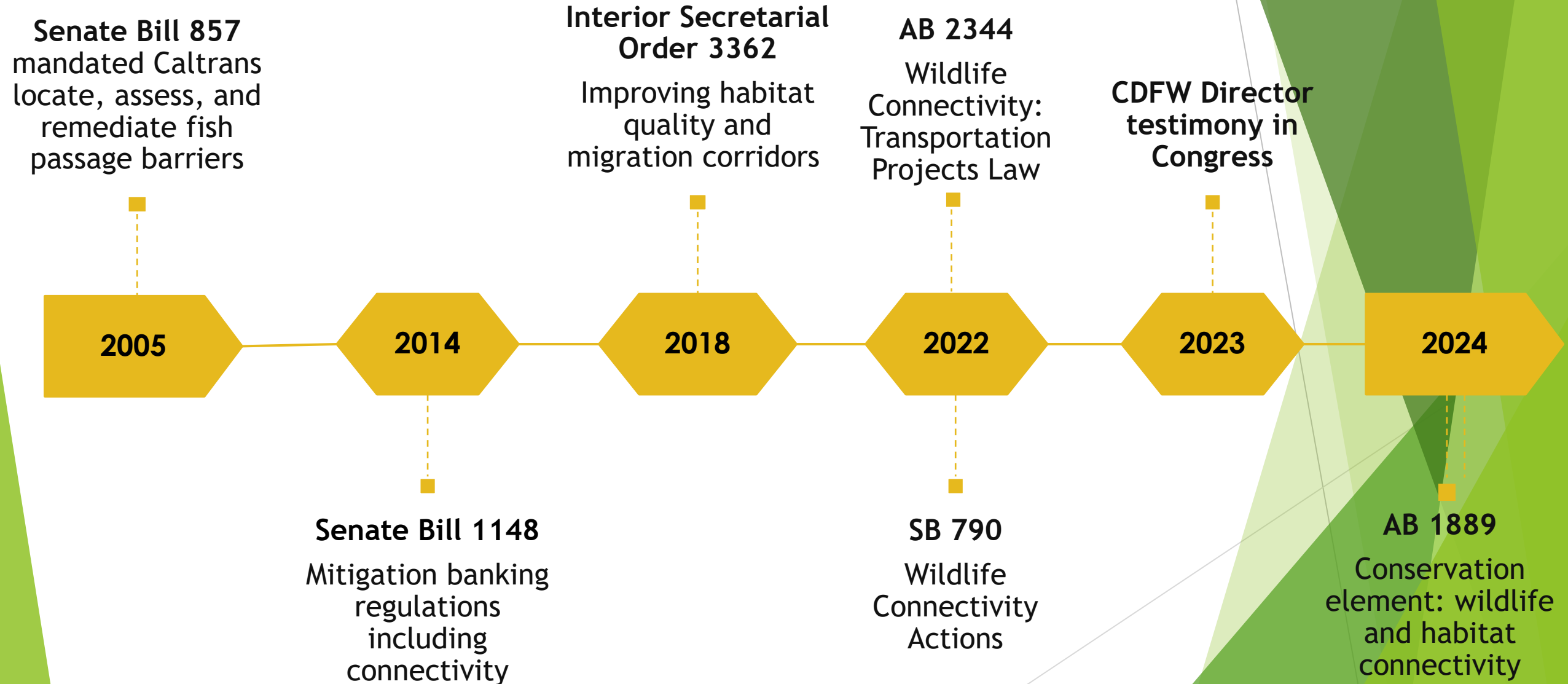
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# Wildlife Connectivity Relevant Timeline



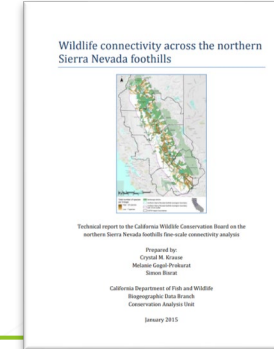
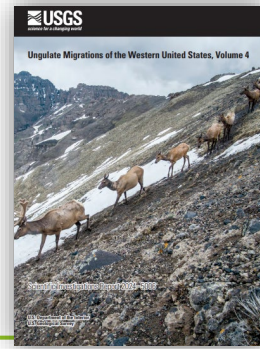
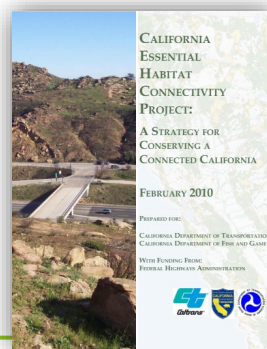
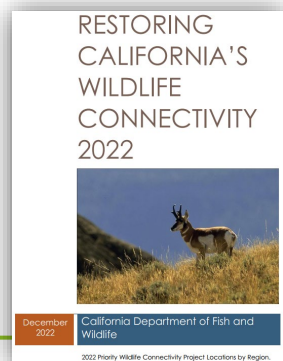
# Prior to Wildlife Connectivity: Transportation Projects Law (AB 2344)

No dedicated resources or single connectivity contact

No regional staff dedicated to connectivity

Fragmented across CDFW branches and programs

CDFW connectivity outputs and collaborations



## Planning

- ▶ Work with Caltrans in the implementation of AB 2344
- ▶ Identify connectivity areas
- ▶ Barriers document
- ▶ Identify/conservate lands (CE, fee title, etc.)
- ▶ Provide engineering advice (as needed)
- ▶ Develop best management practices/mitigation
- ▶ Assist with CEQA reviews
- ▶ Assist other entities as needed

## Construction

- ▶ Collaborate to ensure that projects are constructed as shown in the plans
- ▶ Assist with project modifications during construction (as needed)

## Funding

- ▶ Caltrans mitigation/project funding
- ▶ Grant Funding: various sources

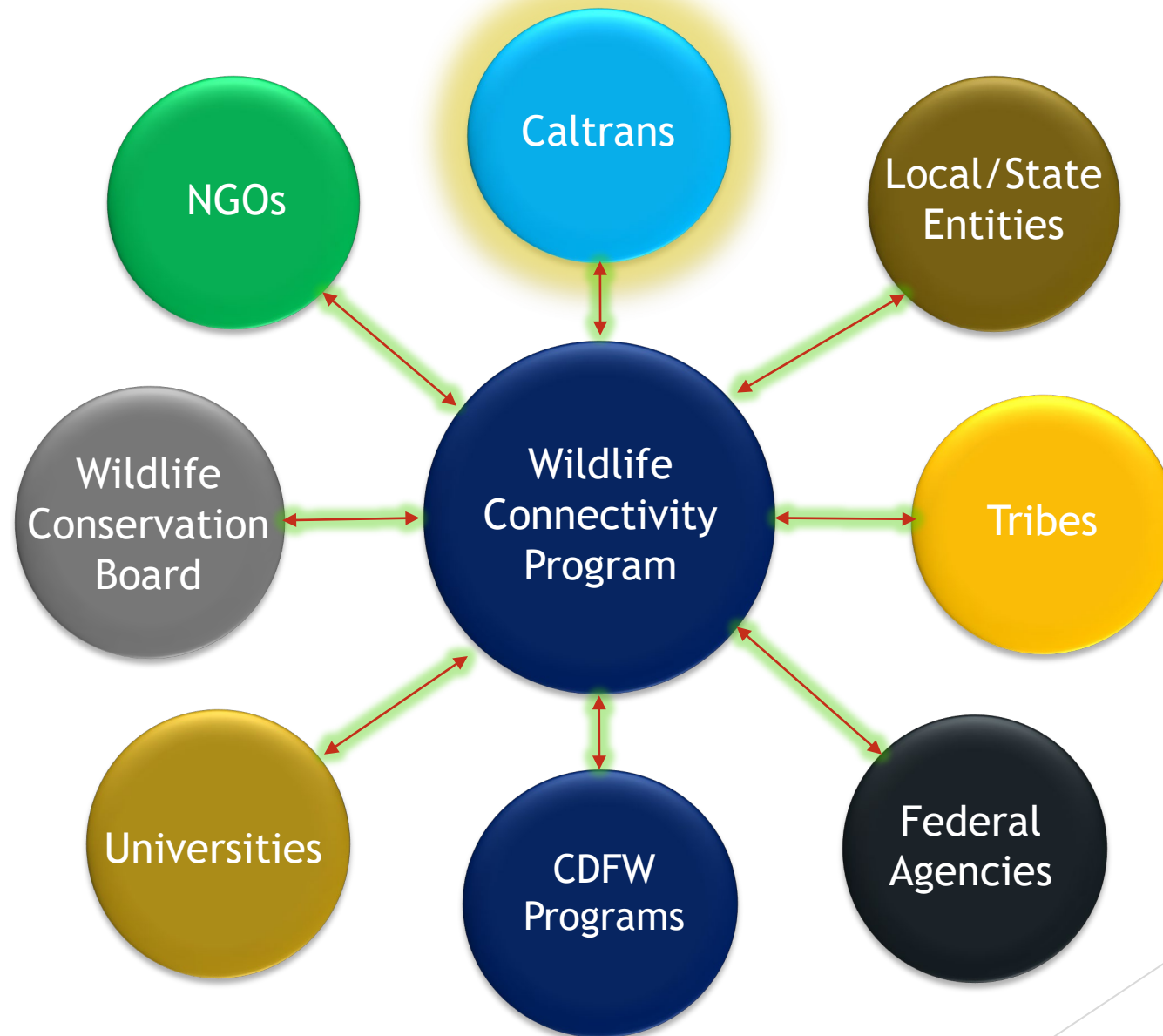
## Monitoring

- ▶ Monitor connectivity project effectiveness
- ▶ Provide scientific data to improve the planning and construction phases

## Outreach



# Stakeholders - Wildlife Connectivity Ecosystem



# Wildlife Connectivity CDFW/WCB Funded Projects



Since 2022 CDFW has provided approx. \$85 million of wildlife connectivity projects. Including \$20 million award to the I-15 Mojave wildlife overcrossings project construction

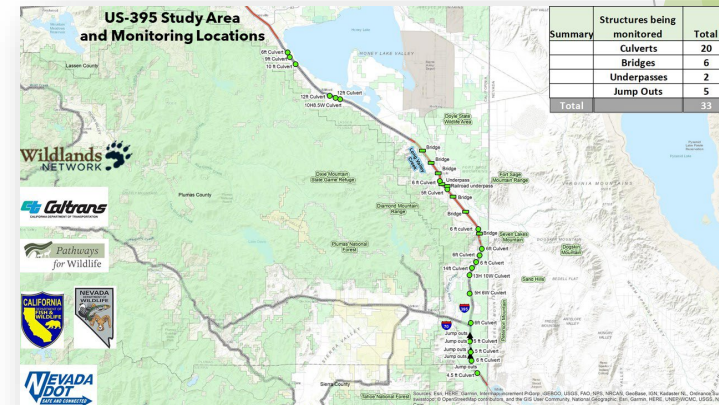


Wildlife conservation board has provided approx. \$95 million since 2020



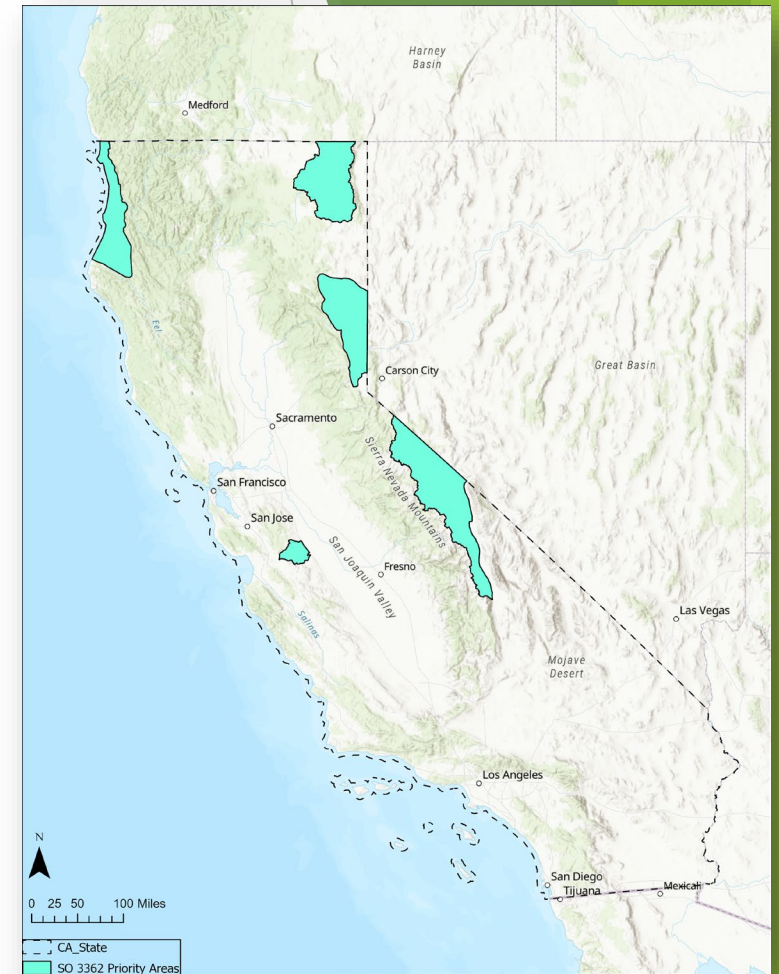
Funds used for:

- Land acquisitions
- Planning
- Construction
- Monitoring



# 2024 State Action Plan Update (S03362)

- ▶ Enhance and improve the quality of elk, mule deer, and pronghorn antelope winter range and migration corridor habitat
- ▶ Designated 5 State Priority Areas
- ▶ 2024 update combined two Priority Areas, expanded another along US-395 Corridor, and added one in Modoc County
- ▶ Current request for proposal is open now for habitat and connectivity restoration projects due on February 13, 2025
- ▶ \$912,678 in previously funded projects



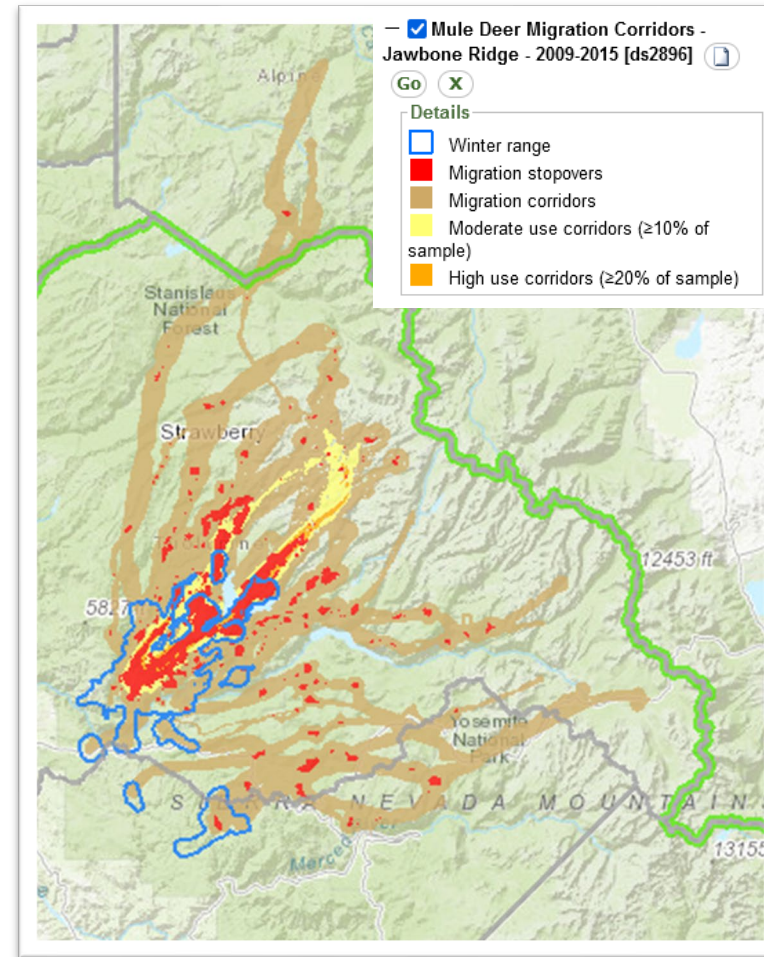
[https://wafwa.org/wp-content/uploads/2024/10/California2024SAP\\_10.17.24-to-FWS.pdf](https://wafwa.org/wp-content/uploads/2024/10/California2024SAP_10.17.24-to-FWS.pdf)



# Ungulate Migration Corridor Mapping (SO3362)

## ► Detailed data on ungulate movements:

- Migration corridors
- Migration stopovers
- Winter ranges



Viewer available at <https://apps.wildlife.ca.gov/bios6/?bookmark=114>



# Terrestrial Wildlife Barriers: 2020-2024

- ▶ Each of the 6 CDFW terrestrial regions identified top 10 priority barriers:
  - ▶ Landscape linkages
  - ▶ Ungulate migration routes
  - ▶ Corridors for sensitive species
  - ▶ Mortality hotspots
  - ▶ Animals approaching roads and turning around
  - ▶ Habitat quality/protections
  - ▶ Range shifts due to climate change



Dataset available at <https://apps.wildlife.ca.gov/bios6/?al=ds2867>







# Terrestrial Wildlife Barriers: 2024 Update

2020: 61 Segments



2022: 146 segments

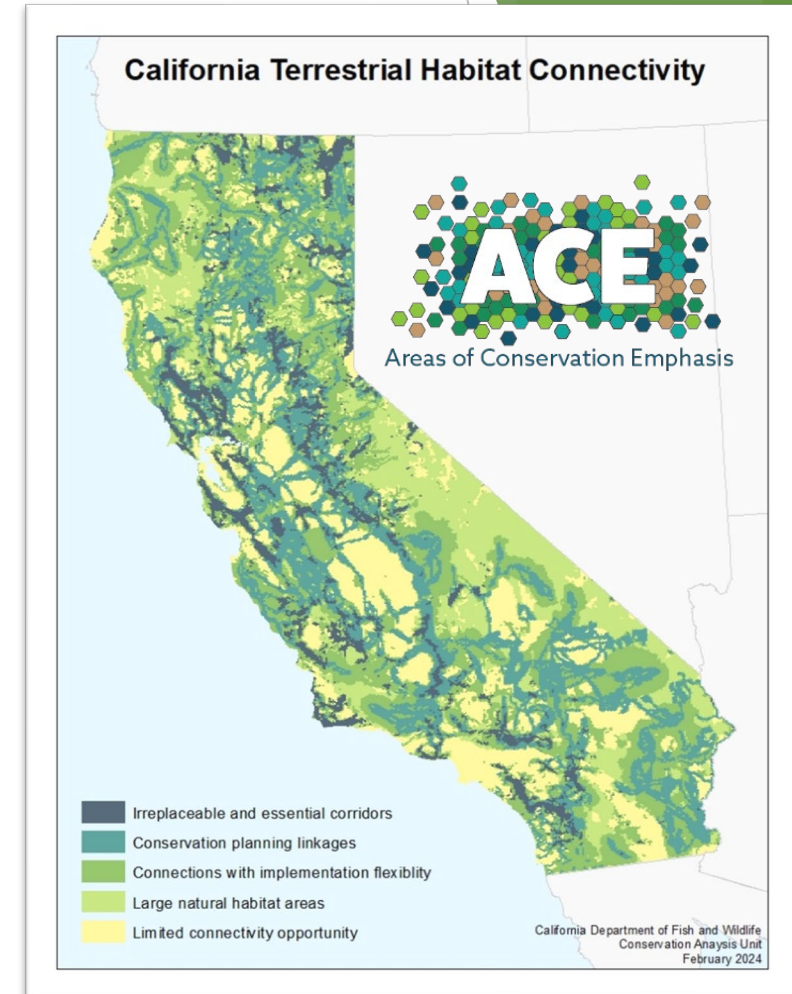


2024: 204 segments



# Areas of Conservation Emphasis

- ▶ **ACE layer (ds2734) IS:**
  - ▶ An aggregate/summary of statewide and regional connectivity studies.
  - ▶ A broad overview of statewide connectivity based on the most up-to-date information.
  - ▶ A tool for quickly locating more detailed datasets for use in regional planning, management, etc.
- ▶ **ACE layer (ds2734) IS NOT:**
  - ▶ A linkage model or analysis
  - ▶ A cost or permeability surface study
  - ▶ A substitute for the original, more detailed connectivity datasets



Factsheet available at <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=150835&inline>



# Examples of Science Collaborations

- ▶ Mountain lion connectivity/UC Davis collaboration
- ▶ Data sharing agreements for connectivity projects
- ▶ Internal potential grant projects:
  - ▶ Highway and crossing monitoring within barriers
  - ▶ I-15 Mojave wildlife overcrossings monitoring
  - ▶ Tehachapi Pass Connectivity Study
- ▶ Hallelujah Junction Wildlife Area fencing study
- ▶ Southern Sierra Nevada foothill linkages study (BDB)
- ▶ Pronghorn and elk connectivity and habitat use (NWF)
- ▶ Endangered species connectivity - Section 6 grants applications open winter 2024-  
(<https://wildlife.ca.gov/Grants/Endangered-Species>)

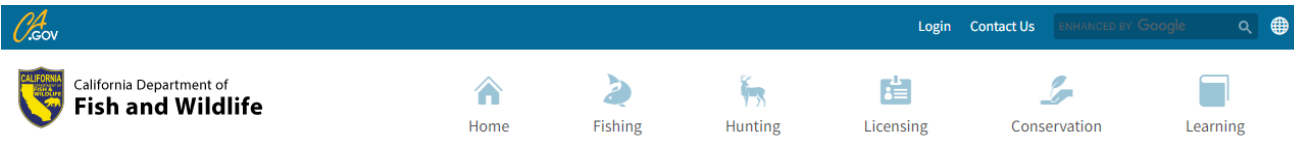


Photo Credit: Glenn Ingles



Photo Credit: Bill Stagnaro

# CONNECTIVITY RESOURCES



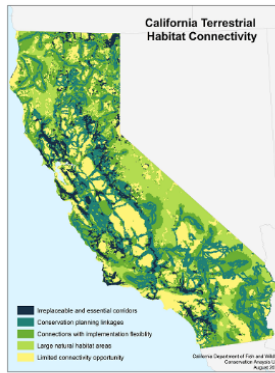
Home | Data | Analysis | **Connectivity**

## Terrestrial Habitat Connectivity

The Conservation Analysis Unit (CAU) develops and maintains spatial data and models of wildlife movement, corridors, and habitat connectivity across California. These maps and models are used by scientists and decision-makers to inform how to best conserve habitat connectivity, or the ability of species and ecological processes to move through the landscape. Major projects undertaken by the CAU include 1) development of wildlife movement corridor models based on GPS collar data; 2) facilitating the development of regional, fine-scale connectivity models to identify focal species-based habitat linkages in each region of the state; 3) compilation of existing habitat linkage data from multiple sources across the state into a single statewide Terrestrial Habitat Connectivity map; and 4) identification of major barriers to wildlife movement across the state.

Information on CAU connectivity projects is summarized in the tabs below. For an overview and links to connectivity work conducted by other CDFW programs, visit the [CDFW Science Institute Habitat Connectivity webpage](#).

The spatial data developed by CAU scientists is available for viewing and download in the CDFW spatial data library: the [Biogeographic Information and Observation System \(BIOS\)](#). The primary BIOS Viewer can be launched from the first button below. Additional configurations of BIOS have also been organized with select data layers on particular topics or projects preloaded in the table of contents. These are accessible through additional buttons below.



### Conservation Data Analysis

- ▶ [Habitat Connectivity](#)
- ▶ [Climate Change Vulnerability Assessment](#)
- ▶ [Areas of Conservation Emphasis \(ACE\)](#)
- ▶ [California Wildlife Habitat Relationships \(CWHR\)](#)

## Spatial Data and Connectivity Viewers

[Getting Started in BIOS 6 \(PDF\)](#)

[BIOS 6 Viewer](#)

Launch point for BIOS 6, the CDFW spatial data library and viewer

[Habitat Connectivity Viewer](#)

A specially curated version of the BIOS 6 Viewer, preloaded with all available statewide and regional connectivity layers

[NSNF Connectivity Project Viewer](#)

Data layers from the [Northern Sierra Nevada Foothills \(NSNF\) connectivity project](#)

[Ungulate Migration Viewer](#)

Movement data for California deer, elk, and pronghorn

▶ [Terrestrial Connectivity \(ACE\)](#)

▶ [Wildlife Barriers](#)

▶ [Ungulate Migration Corridors, Migration Stopovers, and Winter Ranges](#)

▶ [Sierra Nevada Foothills Connectivity Modeling Project](#)

<https://wildlife.ca.gov/Data/Analysis/Connectivity>








# Questions?





# Q&A Session

## Submit Questions

- Select appropriate icon
  - **Internet Browser:** select 
  - **Webex Software:** select “▼ Q&A”
  - **Mobile App:** select , then 
- Type question/comment into Q&A box
- Moderator will read question/comment out loud






**Thank you!**





California Department of Transportation  
 HQ Division of Environmental Analysis




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