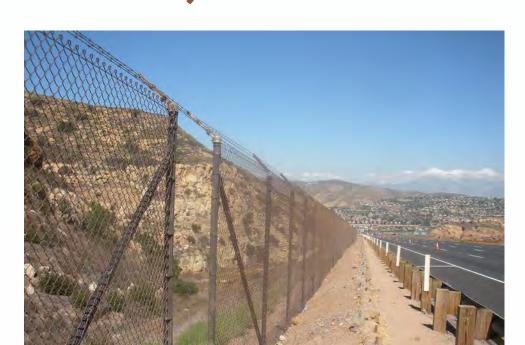
# Enhancing Wildlife Connectivity Along California's Highways:

The Case of State Route 241 Wildlife Protection Fence in Orange County, California

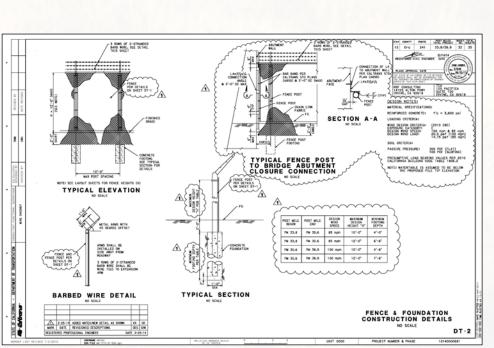
## Project Objectives:



through appropriate design and construction



Reduce habitat loss and fragmentation



Develop reproducible exclusionary fence design guidelines

## Methodology:

- Monitored wildlife movements and survival (2001-2013) Conducted a thorough literature review and analysis of mule deer helicopter surveys conducted in 2011
- Collected data from GPS-collared pumas (movement patterns, right-of-way fence intrusions, successful roadway crossings, and mortalities)
- Documented mortalities for the four target species (puma, mule deer, coyote, and bobcat) as provided by the California Department of Transportation District 12 or accumulated and documented on the ground for the period 1998-2012
- Documented, photographed, characterized and mapped existing fence defects and wildlife activities
- Conducted extensive on-the-ground examination of roadway, shoulder areas, bridges, culverts and existing fencing
- Utilized right-of-way data and GIS vegetation layers to document habitat types and coverage
- Installed and monitored infrared cameras at bridge and culvert undercrossings
- Commenced monitoring to determine if:
- The exclusionary fencing reduces collisions;
- There are changes in use patterns along the roadway because of the fence; and
- There are impacts on the overall welfare of the Santa Ana Mountain puma population

## Fence Design:

Fence Length: both sides of a 6.5 mile (10.5 km) stretch

Fence Height: 10-12 feet (3-3.7 m) depending on terrain

Fence Outrigger: three (3) strands of barbed wire on 18-inch (46 cm) steel posts angled away from the roadway to prevent animals from climbing the fence and onto the roadway

coyotes) from digging under it and getting onto the roadway

Fence Material: nine (9)-gauge (6.0 mm²) and two (2)-inch (5 cm) diamond mesh

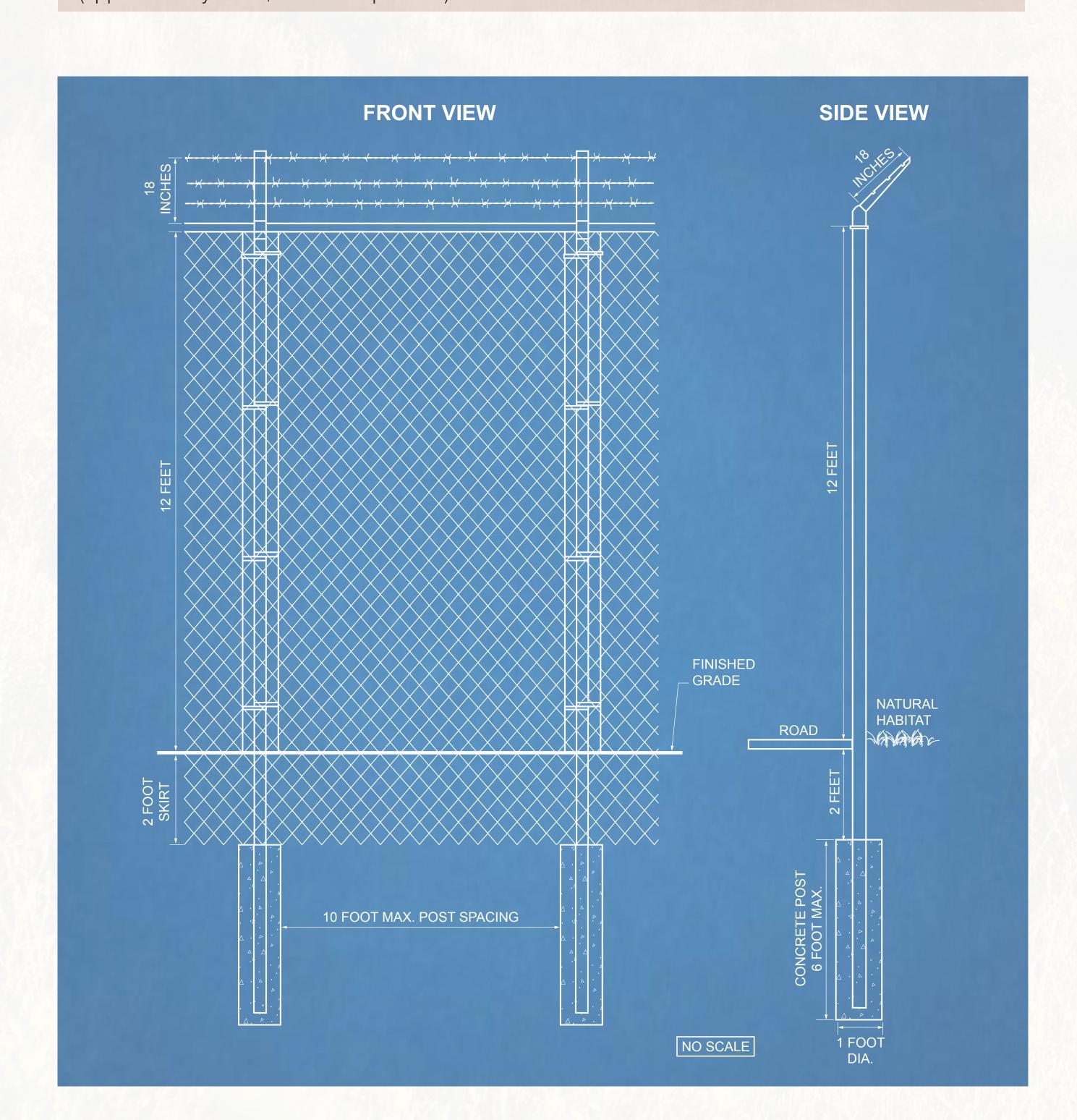
Earthen Jump Out Ramps: located every 1/2 mile (0.8 km) to provide an escape in the event that an animal gets on the roadway

#### Other Facts:

Anticipated Fence Effectiveness: 90-95 percent increase in undercrossing utilization

Habitat Opened to Wildlife: approximately 180 acres (73 hectares)

Project Design and Construction Costs (2012): U.S. \$10 million (approximately U.S. \$1.5 million per mile)



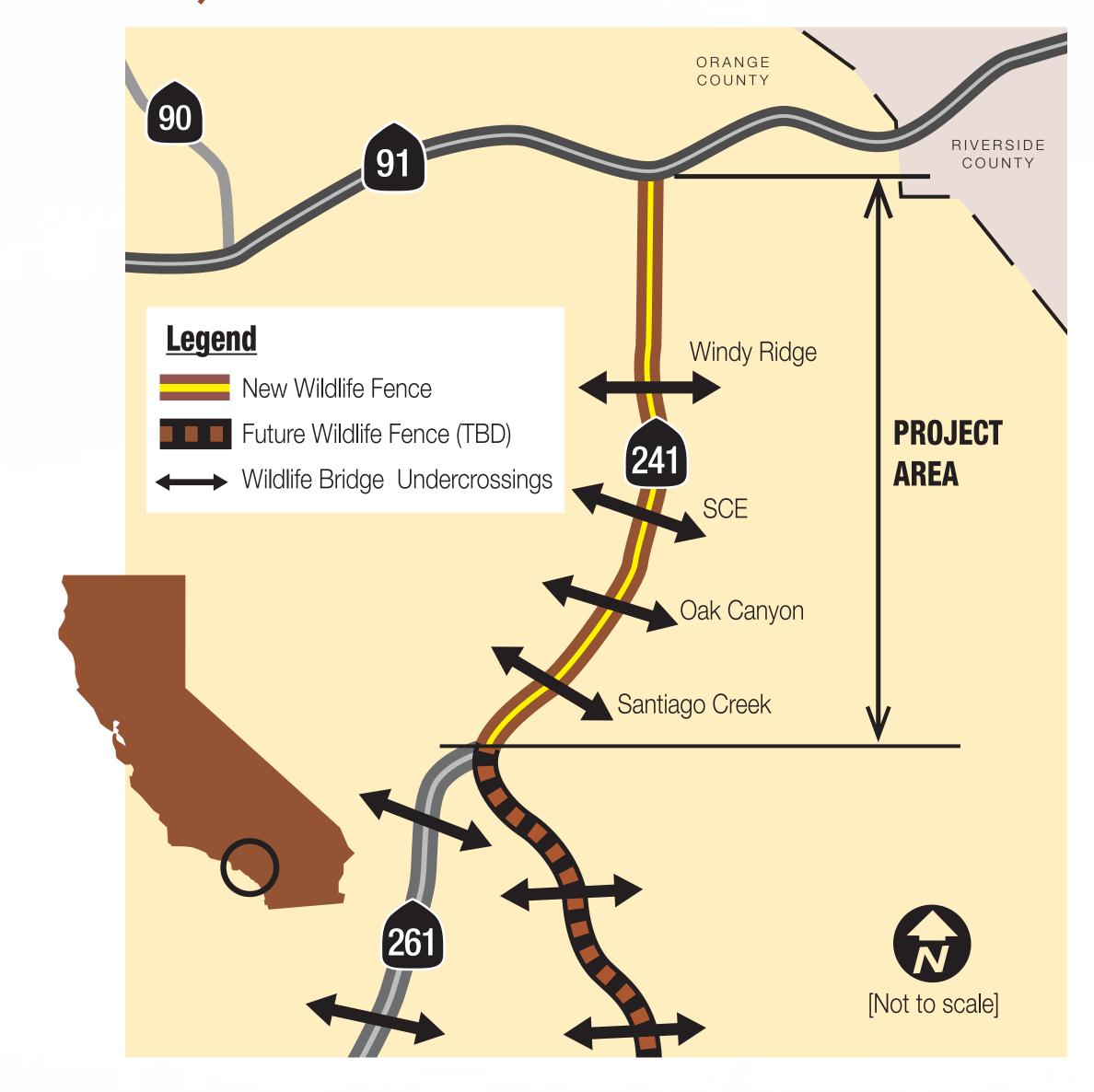


## The Fence is Designed to:

- Exclude animals from the roadway via proper location, height and continuity
- Funnel animals to bridge and culvert undercrossing structures that are safe for their passage
- Minimize the amount of attraction of wildlife to areas adjacent to the roadway
- Utilize fence placement (high visibility to maintenance crews) to ensure quick detection and repair of damage to fencing, should it occur
- Avoid crossing natural drainages or concrete v-ditches if at all possible, and if crossing of such structures cannot be avoided, utilize other measures to ensure that wildlife are unable to penetrate fencing at these points
- Allow escape from the roadway, via jump-out ramps, if animals accidentally gain entry



#### Project Location:



Construction of the new fence along the ETC [Eastern Transportation Corridor] will result in an overall benefit to wildlife as it will greatly reduce wildlife-vehicle collisions and improve the effectiveness of the existing undercrossings.

United States Fish and Wildlife Service

The completed project will enhance wildlife connectivity by providing safe passage through the improved highway undercrossings. The project will ensure that the range of species protected by the NCCP/HCP will continue to thrive at sustainable Mark Denny, President, Nature Reserve of Orange County

Improving undercrossings along the route will significantly improve wildlife connectivity and ecosystem sustainability, and will improve public safety by helping any conflicts between wildlife and vehicles.

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