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CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION
TRANSFORMING IDEAS INTO SOLUTIONS

# Research Notes

## LED Lighting SSPs to Reduce Ecological Impacts on Terrestrial Wildlife

This task will develop knowledge that will allow for the design of effective and safe roadway lighting systems with (light emitting diodes (LEDs) that minimize impacts to wildlife.

Environmental

**November 2025**

**Project Title:** LED Lighting SSPs to Reduce Ecological Impacts on Terrestrial Wildlife

**Task Number:** 4475

**Start Date:** June 1, 2025

**Completion Date:** May 31, 2027

**Task Manager:**

Simon Bisrat
Senior Environmental Planner
Simon.Bisrat@dot.ca.gov

### WHAT IS THE NEED?

Roadway lighting sources that have been in use for the better part of a century or more are rapidly being phased out in favor LEDs. This transformation has been driven by energy efficiency and total replacement of legacy technologies such as low-pressure sodium and high-pressure sodium lamps. Because the LED products first available produced light appearing blue and bright, their replacement of the yellow-orange hues of sodium vapor lighting raised significant concerns among biologists, who recognized adverse consequences of this change in spectral composition to sensitive wildlife. The California Department of Transportation (Caltrans) is increasingly being asked to evaluate these adverse impacts to wildlife when consulting with federal and state regulatory agencies. However, Caltrans practitioners lack the knowledge on how to evaluate the potential adverse effects and the means on how to minimize any adverse effects.

### WHAT ARE WE DOING?

This task will involve synthesis of existing research, new laboratory and field investigations that fill crucial knowledge gaps, development of novel ways to integrate assessment of wildlife impacts into lighting engineering, and development of suggested design practices that can be deployed by Caltrans.

### WHAT IS OUR GOAL?

The goal of this task is to expand knowledge that will allow for the design of effective and safe roadway lighting systems

Caltrans

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with LEDs that minimize impacts to wildlife. Guidance materials for evaluation and mitigation of the potential impacts to wildlife will be developed for use by Caltrans personnel.

## WHAT IS THE BENEFIT?

The benefits of the research would be the protection of sensitive biological resources through the adoption of best management practices for roadway lighting during the conversion to LEDs and also when new lighting is added to unlit areas for safety reasons. Costs to Caltrans could be reduced through a streamlined regulatory process that reduces uncertainty surrounding impacts to sensitive species based on the best available science. Within this context the results of the proposed research could be used to: (1) establish significance impact thresholds by intensity and spectrum for species or groups of species; (2) use generalized impact maps to extrapolate species-specific impact zones from different lighting technologies and configurations; (3) set procedural triggers for further consultation based on species presence and known lighting impacts; and (4) establish systemwide lighting design standards as a "no regrets" policy for biological resources impacts.

## WHAT IS THE PROGRESS TO DATE?

A researcher from University of California Los Angeles has been selected. The contract preparation phase has been completed. The contract is executed by the anticipated start date of June 1, 2025, and a project kick-off meeting has been conducted that involved all the research panel members. The research team has sought more input from the panel members who are lighting engineers, and a focused meeting was conducted in October 2025 to provide the requested input. This Task is progressing well.