



Environmental Influences Research Roadmap



Support a sustainable transportation system for California by developing ways to avoid or reduce the negative environmental impacts of transportation projects.

Identify Challenges

Determine Environmental Impacts of Transportation Projects

Enable accurate identification of the nature, duration, extent, and probability of occurrence of the environmental impacts resulting from construction, operation, and maintenance of transportation infrastructure.

Use non-invasive genetics to compare how a California freeway affects gene flow in a disturbance-averse versus a disturbance-tolerant species.

Challenge: Use coyotes and gray foxes as a model system in which to study how freeways affect species with different disturbance tolerances. These species make an excellent model system because of the many similar aspects of their life histories, such as reproductive phenology, timing of dispersal, and dietary patterns (i.e., frugivory, carnivory), with the primary differences tied to habitat specialization.

Task: Determine whether freeways are greater barriers for disturbance-averse (gray fox) than for disturbance-tolerant (coyote) species. UTC-NCST, Project 939/Task 2978 [Per Geohaz project: screen back or otherwise de-emphasize these identifiers.]

Time frame: 8/31/2015 - 6/30/2017

Identify Sensitive Species

Enable economic and accurate identification of the presence of sensitive species that will affect planning, construction, operation, and maintenance of transportation infrastructure.

Develop a tidewater goby survey method using environmental DNA

Challenge: The tidewater goby is an endangered species whose coastal California habitat can interfere with Caltrans and local roads with stream crossings.

Task: Collaborate with the U.S. Fish and Wildlife Service and others to develop a reliable survey methodology for detecting the tidewater goby, including eDNA as a tool to help streamline endangered species consultations for this fish. Project 1002/Task 2724

Time frame: 7/1/2015 - 4/30/2018

Address Challenges

Mitigate Environmental Impacts of Transportation Projects

Enable cost-effective reduction of the duration, extent, and probability of occurrence of the environmental impacts resulting from construction, operation, and maintenance of transportation infrastructure.

Culvert Project Planning Cost Estimate Tool

Challenge: Understanding the true cost of each road stream crossing structure type will help project designers make the most cost-effective structure choice, better comply with state and federal environmental regulations, and provide Caltrans with a usable method for cost estimation.

Task: Quantify the long-term costs of road stream crossings that span the bankfull width of a waterway in order to provide an accurate picture of the total life-cycle cost of the structure. Then compare these costs to the costs of structures that constrict stream flows. NCHRP25-25/Task 9, Project 858/Task 2528

Time frame: 11/30/2012 - 6/30/2016

California Sensitive Amphibian and Reptile Highway Crossings

Challenge: Caltrans lacks the critical information necessary to plan, design, and construct cost-effective highway crossing designs for endangered, threatened, and other sensitive terrestrial related reptiles. Without consensus on appropriate guidance and designs for these animals, Caltrans is challenged to meet environmental obligations and obtain permits and agreements necessary to construct highway projects within desired schedules.

Task: Develop the information necessary for Caltrans practitioners to design and install cost-effective highway crossings for amphibians and reptiles that are listed as threatened or endangered, or deemed sensitive by the California Department of Fish and Wildlife.

1. Develop information for designing road crossings for selected sensitive reptiles.
2. Field test road crossings for selected sensitive reptiles.
3. Develop guidance materials for road crossings for selected reptiles for use by Caltrans personnel. Project 927/Task 2666 & Task 2700

Time frame: 7/1/2014 - 6/30/2020

Underwater Noise Attenuation Experimental Methods

Challenge: For several years, concern over the impact of underwater noise from construction pile driving has created regulatory challenges and has impacted construction practices and schedules. New methods are needed to attenuate the underwater sound to protect species in marine and estuarine waters and to efficiently drive piles for overwater structures.

Task: Develop and field test underwater noise attenuation devices in marine and estuarine waters to meet thresholds established to protect ESA listed specials and Marine Mammals. TPF-5(323), Project 967/Task 2776

Time frame: 5/8/2014 - 12/31/2017

Near-Road Air Quality Research

Challenge: New federal regulations require state and local agencies to monitor near-roadway emissions and quantitatively assess potential for air quality impacts ("hot-spots"). State DOTs need to develop analysis methods and expertise to understand the new hot-spot data, complete hot-spot modeling, and implement effective mitigation. A pooled fund of state DOTs would provide a unique venue for collaboration between state DOTs and FHWA to clarify challenges, prioritize research needs, discourage redundant individual state efforts, and to quickly initiate research that develops solutions that meet the needs of multiple states. TPF-5(284), Project 866/Task 2538

Tasks may include:

1. Synthesize routine and special study near-road pollution data and information; summarize completed and ongoing research; prioritize information gaps and needs; assess situations with potential for near-road impact.
2. Design and create the web-based infrastructure to discuss near-road air quality issues and share related information.
3. Evaluate and compare line source dispersion modeling approaches against measured concentration data.
4. Develop best practices for near-road air quality modeling (e.g., meteorological data collection and use) and disseminate via workshops and training.
5. Develop screening protocols to reduce project or operational scenario analyses with non-substantive impacts.
6. Evaluate mitigation strategies (e.g., noise wall, land use plan, and pavement option impacts on near-road air quality).

Time frame: 1/11/2013 - 12/31/2017



Environmental Influences Research Roadmap continued



Support a sustainable transportation system for California by developing ways to avoid or reduce the negative environmental impacts of transportation projects.

Address Challenges

Reduce Production of Greenhouse Gasses

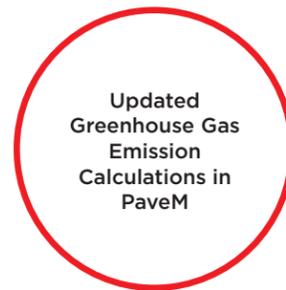
Determine means by which Caltrans can reduce the production of greenhouse gasses (GHG) and hence decrease the impact of California's transportation sector on global warming.



Challenge: Caltrans needs to address additional issues required to meet AB32's GHG emission targets and category pollutant regulations using environmental life cycle analysis (LCA) following the Pavement LCA Roadmap.

Task: Develop additional and/or improved algorithms for LCA for the range of design, construction, maintenance, and rehabilitation strategies used in California. Questions to be addressed include design life, pavement type selection for truck lanes, continued work on analyzing Caltrans recycling strategies, regional data collection to improve California-specific LCA procedures and support environmental product declarations (EPD) and LCA calculation processes. PPRC14 SPE Sus-B, Project 932/Task 2718

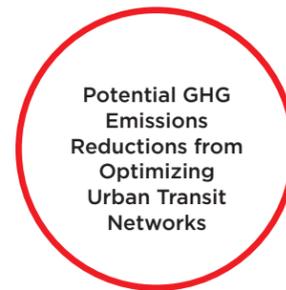
Time frame: 7/1/2014 - 9/30/2017



Challenge: Caltrans needs to update models and analysis options in Pavem based on validation and calibration of LCA models for pavement effects on vehicle emissions, including results of proposed projects 4.1 and 4.2.

Task: Incorporate improved simplified LCA GHG calculations into Pavem software. PPRC14 SPE Sus-C, Project 932/Task 2719

Time frame: 9/1/2014 - 11/30/2017



Challenge: Recent investments in the transit sector to reduce GHG emissions have concentrated on purchasing efficient replacement vehicles. There has been little focus on the potential of operational and design modifications, such as changes in headways, route spacing, and stop spacing to reduce transit emissions. California Senate Bill 743 (SB 743) allows cities to opt out of using Level-of-Service (LOS) standards when evaluating the impacts of transportation projects, and to adopt metrics such as Vehicle Miles Traveled.

Task: Evaluate the potential benefit of design and operational approaches to reducing the environmental impacts of transit systems. UTC-UCCONNECT, Project 988/Task 2862

Time frame: 2/6/2015 - 7/30/2016



Challenge: This research will explore the determinants of GHG reductions from bicycle projects in order to set an agenda for future data collection and assist the California Department of Transportation in estimating GHG reductions.

Task: Augment existing before-and-after bicycle count data with original intercept survey data. Estimate the change in GHG and discern the key factors that determine the magnitude and direction of the change, considering bikeway type, locational context, population and employment variables, and local travel behavior, among other variables. Final research product will be a methodology to estimate GHG reductions from bikeway projects. UTC-UCCONNECT, Project 1014/Task 2919

Time frame: 4/17/2015 - 6/30/2016

For more information: