

RESEARCH PROBLEM STATEMENT #EV-504

I – Problem Title

The Effectiveness of Off-Structure Bat Houses Meeting Attraction/Mitigation Regulatory Agency Requirements for State Highway Projects (EV6)

II – Research Problem Statement

Question: Could artificial structures be used to minimize the contact between Caltrans personnel and bats that want to roost on or near bridge structures and still provide the necessary roosting habitat that will be acceptable to resource agencies? Gather facts and data establishing the successful occupancy by a variety of crevice dwelling bat species in pole-mounted bat houses and other types of artificial habitats throughout the United States with an emphasis on California. California has many bridges located in areas that are known sites or are favorable sites for supporting bat colonies. Bats should not be handled by humans and their direct contact or contact with their droppings by humans can be unhealthy. Approximately less than 1% of bats may harbor the rabies virus. A rare lung fungus, histoplasmosis, may be found in bat guano although no confirmed cases have been observed in California. Biennial bridge structure maintenance inspectors, field maintenance personnel, construction personnel, and emergency post-earthquake inspectors need complete and unhindered access to every portion of the bridge structure. The presence of bat colonies on the bridge increases the costs and safety precautions necessary for inspecting bridges and reduces the flexibility in the timing of those inspections. Pole-mounted bat houses as well as many other off-structure artificially created habitats could be a practical and effective alternative to placing bat houses on bridges. A review of current informational sources combined with field demonstration could yield new options to reduce maintenance costs while improving worker safety.

III – Objective

The objective of this two-part research proposal is to document and then demonstrate the effectiveness of off-structure bat houses in California, in order to effectively eliminate the need to provide replacement habitat for bats on structures. Part 1 will be completed, including reporting to the Department prior to the commencement of Part 2.

PART 1: LITERATURE SEARCH

The scope of this research should address the following:

- (a) Criteria by the California Department of Fish and Game (DFG) and the United States Fish and Wildlife Services (USFWS) for the acceptance and use of off-structure bat houses.
- (b) FHWA guidelines concerning bat houses, on and off bridges.
- (c) Off-structure bat house design criteria currently in use in the other State DOTs and Canadian Transportation Agencies.
- (d) Collect and document facts concerning the effectiveness of off-structure bat houses for the following bats: Mexican Free-Tailed, Pallid, and the Myotis species in general. Information obtained shall include but is not limited to: location of off-structure houses, types of bats occupying the houses, number of bats, years in service, materials used for construction, general site information, owner's impressions and suggestions.

(e) Develop recommendations for the design and site positioning of off-structure bat houses based on the research findings and the commentary from affected resource agencies, mainly the DFG and the USFWS.

PART 2: FIELD EXPERIMENT

Place off-structure bat houses that have been designed based on the recommendations from the literature review at four separate California locations on state owned right-of-way (one site in the north, two sites in the central region, and one site in the south) most likely to sustain bat colonies. Over the course of four years, monitor and document the following: the number and species of bats occupying the structures, time of the year the structures are occupied, periodic monitoring of the structure temperatures as necessary, condition of the structures, and maintenance requirements per structure. Off-structure house designs and locations will be presented to Department personnel for concurrence prior to implementation.

IV – Background

Many of California's bridges are located at sites that currently serve or potentially could serve as homes for bats. Recently there has been an increased effort by local and state authorities to provide homes for bats on bridge structures. Bats are known to be beneficial to humans because they eat large amounts of agricultural pests, are known to serve as a pollinator vector, and feed upon insects that are established dangers to the health of the general public such as mosquitoes that spread the often fatal West Nile Virus. Bats and their droppings can also be very unhealthy. Caltrans personnel must take extra precautions or develop alternative schedules to inspect, repair, or perform regular maintenance functions at bridge locations occupied by bats. By providing off-structure homes for bats, Caltrans personnel could safely and successfully perform their jobs and the bats can live and grow in a favorable environment.

V – Statement of Urgency and Benefits

The facts and data that will be gathered by this research will support the Caltrans single mission of improving mobility across California and the goals of Safety, Reliability and Productivity. Safety for Caltrans employees will be enhanced because the proposed procedure of separating bats and people will be shown to be successful. The Safety of the traveling public will be ensured because inspection personnel will have access for complete examination of all bridge components. Reliability in the transportation system will be enhanced by reducing delays resulting from inspection and construction site access difficulties. Productivity of the transportation system and workers will be improved because of the efficiency of site access without bat restrictions, thereby allowing appropriate inspection and maintenance activities.

The benefit to the state's agricultural sector could range in the thousands of dollars because of a reduction in the need for pesticides, but there are adverse costs associated with personnel exposure. The costs incurred due to maintenance, construction, and inspection restrictions could be upwards of tens of thousands of dollars especially if bat relocation mitigation must be employed. Although exposure to the rabies virus carried by some bats may be rare, there are potential associated medical costs.

Bats roost throughout much of California and are extremely beneficial to the State's agricultural sector because they consume vast quantities of pests and insects that would otherwise feed on valuable crops. Bridge structures offer ideal habitats for bats and regulatory agencies are requiring bat friendly designs in rural farm areas and over water crossings where bats may decide to roost. Bat droppings, commonly referred to as "guano", contains microbes, bacteria and fungi that can be unhealthy for humans. A rare fungi known as histoplasmosis, associated with guano in other states but not reported in California, has been linked to lung infections. Direct contact with bats, as with other wild mammals found in California can transmit the rabies virus. Approximately less than 1% of the bat population may contain the rabies virus. Every bridge in the State's inventory is mandated by the Federal Highway Administration to be inspected on a biennial cycle. During these inspections, personnel are exposed to bats and their guano, because their roosting sites are often located in areas requiring close inspection attention. Thus, alternative solutions must be sought to ensure both the safety of Caltrans personnel and the survival of the bat colonies.

VI – Related Research

(a) Bat Conservation International (BCI) sponsors the North American Bat House Research Project that investigates, researches, and reports matters concerning the successful use of bat houses. BCI was established in 1982 for the purpose of conserving and restoring bat populations and their habitats around the world. They have since become recognized as the international leader in conservation initiatives that protect bats and their habitats.

(b) "The Bat House Builder's Handbook", the "Building Homes for Bats" video, and numerous other informative materials as well as manufactured bat houses can be obtained from BCI.

(c) Maberry Centre Bat Homes provides manufactured bat houses and documented research about the success of their bat homes.

(d) Chiroptera Cabin Company provides manufactured bat houses and documented research about the success of their bat homes.

(e) Substantial effort has been accomplished internally (see attached "Caltran's Guidelines for Off-structure Pole Mounted Bat Houses")

(f) A number of sites exist online that are dedicated to the preservation of bat colonies. Several are listed below:

<http://www.batcon.org>

<http://www.batmanagement.com>

<http://www.californiabats.com>

<http://www.maberrybat.com>

<http://www.chiropteracabins.com>

<http://www.flybynightinc.com>

<http://www.naturesfriend.com>

(g) An analysis of factors such as materials and designs of roosts known to occur in bridge is available within the Department. This includes factors such as design, temperature, location, etc.

VII – Deployment Potential

This research could assist the Department in obtaining regulatory agency “buy-in” to the use of off-structure bat houses. Removing bat habitation from structures to off-site locations reduces Department personnel exposure during biennial bridge inspections, as well as maintenance and construction efforts necessary to sustain the expected lifecycle use of the structure.