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**Interim Report for the Bat Assessment Survey for Paraiso Springs Resort
March 25th, 2008**

Introduction

Special-status bat species

There are fifteen bat species known to occur in the Monterey County area in California. Six of these species have some level of special-status (see Table 1). The focus of bat surveys was on existing structures at Paraiso Springs Resort that are planned to be demolished. Oak trees and other trees in development areas that represent potential roosting structures for bats were also assessed. A general habitat assessment was conducted to provide context of the local bat fauna and potential impact of proposed development.

Roosts

Bats use structures, such as bridges and buildings, for roosting habitats, including day roosts, night roosts, and maternity roosts. Day roosts are areas where bats are able to spend the non-active period of the day resting or in torpor, depending on the weather conditions. Day roosts provide shelter from the elements and safety from predators. Night roosts are used by bats to rest between foraging bouts, to allow for digestion of prey, to escape from predators, as shelter from weather, and possibly for social purposes. Night roosts are typically sites that retain heat from the day to aid the bats in maintaining the higher metabolism necessary for digestion. Maternity roosts are sites that provide protection from the elements and predators and provide the correct thermal environment for reproduction. Maternity roost sites tend to be warmer in temperature because breeding females need to maintain a high metabolism to aid in lactation and juvenile bats need to keep warm to maintain a metabolic rate that allows for rapid growth. Winter roosts are usually areas that have a stable low temperature suitable for hibernating or prolonged periods of torpor.

METHODS

Building surveys

All of the buildings in the project were visually investigated to determine if bats are using the structure for day roosting, night roosting, or maternity roosts. Buildings were

surveyed during the day for day and maternity roost assessment. All bats were identified to species and any sign such as guano, staining, or culled insect parts, were identified and quantified when possible.

Acoustic surveys for habitat assessment

Acoustic monitoring was done with four Anabat acoustic units, consisting of an Anabat II bat detector and storage zero crossing analyzers to collect acoustic files of the echolocation calls of the bats. The Anabat systems use a bat detector to detect bat ultrasonic echolocation calls in the field and use a zero-crossing unit to convert the detected signals into frequency/time graphs to be viewed on a computer. The graphs allow for bat species identification. Species are identified by their vocal signature graphs by comparing calls recorded during previous mist-netting activities, calls recorded from bats that are visually identified at the time of recording, and by comparing calls with existing bat vocal signature library databases. The Anabat system is commonly used for the survey of bats and is effective at identifying many species in the bat fauna assemblage (Table 3). Four acoustic detector units were deployed around the project area and ran four consecutive nights March 13th-17th, 2008.

Table 1. Bat Species Expected to Occur In the Monterey County Region

Family VESPERTILIONIDAE (Plain-nosed or mouse-eared bats)			
<i>Myotis yumanensis</i>	MYYU	Yuma myotis	
<i>Myotis evotis</i>	MYEV	Long-eared myotis	BLMS
<i>Myotis thysanodes</i>	MYTH	Fringed myotis	BLMS/WBVG
<i>Myotis volans</i>	MYVO	Long-legged myotis	BLMS/WBVG
<i>Myotis californicus</i>	MYCA	California myotis	
<i>Myotis ciliolabrum</i>	MYCI	Western small-footed myotis	
<i>Lasionycteris noctivagans</i>	LANO	Silver-haired bat	
<i>Eptesicus fuscus</i>	EPFU	Big brown bat	
<i>Lasiurus blossevillii</i>	LABL	Western red bat	FSS/WBVG
<i>Lasiurus cinereus</i>	LACI	Hoary bat	
<i>Corynorhinus townsendii</i>	COTO	Townsend's big-eared bat	CSC/FSS/BLMS/WBVG
<i>Antrozous pallidus</i>	ANPA	Pallid bat	CSC/FSS/BLMS/WBVG
<i>Pipistrellus hesperus</i>	PIHE	Western pipistrelle	
Family MOLOSSIDAE (Free-tailed bats)			
<i>Tadarida brasiliensis</i>	TABR	Mexican free-tailed bat	
<i>Eumops perotis</i>	EUPE	Western mastiff bat	
CSC = California Department of Fish and Game's California Special Concern species			
FSS = Forest Service Sensitive species			
BLMS = Bureau of Land Management Sensitive species			
WBVG = Western Bat Working Group High Priority species			
For more information on the meaning of these listings, please visit the Calif. Depart. of Fish and Game's California Natural Diversity Database website: www.dfg.ca.gov			

Table 2. Species known to use structure roosts

Species	Structure Roost Type
<i>M.yumanensis</i>	DR, NR
<i>M.evotis</i>	DR, NR
<i>M. thysanodes</i>	DR, NR
<i>M. volans</i>	DR, NR
<i>M. californicus</i>	DR, NR
<i>E. fuscus</i>	DR, NR
<i>C. townsendii</i>	DR, NR
<i>A. pallidus</i>	DR, NR
<i>L. noctivagans</i>	NR
<i>T. brasiliensis</i>	DR, NR
Species not associated with structures	
<i>L. cinereus</i>	Trees
<i>L. blossevilli</i>	Trees

NR = night roost; DR = day roost;

Pierson, E.D., W.E. Rainey, and C.J. Corben. 2001. Seasonal patterns of bat distribution along an altitudinal gradient in the Sierra Nevada. Technical report for California Department of Transportation, California State University at Sacramento Foundation, The Yosemite Association, and The Yosemite Fund.

Table 3. Anabat Acoustic Analysis Capabilities

Species	Probability of detection	Probability of Identification	Phonic Group
<i>M. lucifugus</i>	high	low	M40 kHz
<i>M. yumanensis</i>	high	med	M50 kHz
<i>M. evotis</i>	med	high	
<i>M. thysanodes</i>	med	high	
<i>M. volans</i>	high	low	M40 kHz
<i>M. californicus</i>	high	med	M50 kHz
<i>M. ciliolabrum</i>	?	low	M40 kHz
<i>E. fuscus</i>	high	med	Q25 kHz
<i>C. townsendii</i>	low	high	
<i>A. pallidus</i>	med	med	Q25 kHz
<i>P. hesperus</i>	high	high	
<i>L. cinereus</i>	high	high	
<i>L. blossevilli</i>	high	high	
<i>L. noctivagans</i>	high	med	Q25 kHz
<i>E. maculatum</i>	audible by human ear (high)	high	
<i>T. brasiliensis</i>	high	med	Q25 kHz
<i>E. perotis</i>	audible by human ear (high)	high	

Probability of detection refers to how readily the species is recorded by the acoustic equipment. This varies because species echolocate at different decibel ranges and different frequencies, which affect how far the echolocation pulse travels and thus their range of detection.

Probability of identification refers to how easily each species is recognizable at the species level from the time versus frequency graph. *Low* indicates that a species will always be grouped at the phonic level and is indistinguishable from other species in that group. *Medium* indicates that the species will often be grouped at the phonic level but can sometimes have a signature call that allows for specific identification. *High* indicates reliable species level identification. Active acoustic monitoring with a spot light to obtain a visual on the bat as it is being recorded can be used to increase the probability of identification for both low and medium species.

Phonic group refers to the grouping of species that have calls that are indistinguishable.

Table 4. Bat Species Detected in the Project Area

Family VESPERTILIONIDAE (Plain-nosed or mouse-eared bats)		
<i>Myotis yumanensis</i>	Yuma myotis	AC (50Khz)
<i>Myotis californicus</i>	California myotis	DR, AC (50Khz)
<i>Myotis volans</i>	Long-legged myotis	DR, AC (40Khz)
<i>Eptesicus fuscus</i>	Big brown bat	DR
<i>Lasiurus blossevillii</i>	Western red bat	AC
<i>Lasiurus cinereus</i>	Hoary bat	AC
<i>Antrozous pallidus</i>	Pallid bat	DR, NR
Family MOLOSSIDAE (Free-tailed bats)		
<i>Tadarida brasiliensis</i>	Mexican free-tailed bat	DR, AC
AC = Detected acoustically		
AC (XXKhz) = Possibly detected in a phonic group		
DR = Observed Day Roosting, NR= Observed Night Roosting, MR=Maternity Roost observed		

Results

Building Surveys

All buildings or structures in the project area were surveyed on March 13th and 14th 2008.

STRUCTURE	BATS or SIGN OF BAT USE	RECOMEMDATIONS
Lower Trailer Restrooms	Day roosting <i>Myotis spp.</i> and <i>T. brasiliensis</i>	Pre-demo Survey and or removal of suitable habitat immediately prior to demolition
House Trailers	No sign	No mitigation measures necessary
Pool Bathrooms	Sign of historic use. Guano flecking on walls. Sheet rock has been removed limiting day roosting potential. High night roost potential	Pre-demo Survey and or removal of suitable habitat immediately prior to demolition June re-check recommended
Rec. Room	Potential night roost and maternity roost	Pre-demo Survey and or removal of suitable habitat immediately prior to demolition June re-check recommended
Boiler Room	Potential <i>C. townsendii</i> guano, indicating potential night roost. Night roost sign on exterior	None
Fire Equipment Room	No sign	
Main Pump House	Minimal night roost activity	
Workshop	Major day and maternity roosts in West and East ends. Multiple species. <i>A. pallidus</i> confirmed.	Pre-demo Survey and or removal of suitable habitat immediately prior to demolition June re-check recommended
Main Lodge	Light Day roosting sign in attic. 1 <i>Myotis volans</i> day roosting in attic.	Pre-demo Survey and or removal of suitable habitat immediately prior to demolition June re-check recommended
Hill Side Cabins	All Hill Side Cabins and restrooms provide roosting habitat in the form of exterior crevices. <i>A. pallidus</i> , <i>T. brasiliensis</i> , <i>E. fuscus</i> , <i>M. volans</i> , and <i>Myotis spp.</i> were observed during visual surveys March 14 th	Pre-demo Survey and or removal of suitable habitat immediately prior to demolition June re-check recommended

Tree Surveys

A review of the Project Tree survey and tree removal plan were reviewed and an on-site evaluation was made of the trees within the development area for potential bat habitat.

Oak trees

The majority of oak trees surveyed in development zones do not offer roost habitat (small dbh, absence of appropriate tree decay). A few large oak trees with suitable hollow limb features for roosting sites exist on the property and were identified as being potentially important bat habitat. We recommend keeping these trees when possible. One large, senescing oak tree (#145) is designated a hazard tree and proper mitigation would require pre-removal survey and a qualified bat ecologist on hand during tree removal activities.

Palm trees

The palm trees on the Paraiso Springs Resort property offer minimal habitat potential for local bat species. Common bat species may use palm skirts for roosts and species that roost singly or in small groups could use this feature during summer for maternity roosts. Recommended mitigation is removal of palm trees during winter months (Nov-Mar) to avoid accidental take during tree removal. No replacement habitat is necessary.

Eucalyptus grove

Eucalyptus trees are not associated with critical bat roosting habitats in California. Acoustic monitoring in March indicated very low bat activity levels in the Eucalyptus grove. Bat activity could be higher during summer months and should be re-assessed during June. Recommended mitigation would include removal of trees in winter months, if possible, if June surveys indicate higher bat activity levels. No replacement habitat is necessary.

Except as noted above, given the large areas of oak woodland habitat surrounding the development area, the tree removal plan would not impact bat habitat.

Acoustic Surveys

Acoustic monitoring was conducted four nights in March 2008. Only 102 Acoustic files were recorded and analyzed. Four species and two phonic groups were recorded during the four nights of surveys.

Site	Bat	MY50	MY40	PIHE	LABL	LACI	TABR
Eucalyptus Grove	0	0	0	0	0	0	0
Palms Near Hot Springs	82	72	8	0	0	0	2
East end of Workshop	4	2	0	2	0	0	0
Lower Indian Valley	16	11	1	0	2	1	1
Total	102	85	9	2	2	1	3

MY50 = *Myotis yumanensis*, *Myotis californicus*

MY40 = *Myotis volans*, *Myotis ciliolabrum*

PIHE = *Pipistrellus hesperus*

LABL = *Lasiurus blossevillii*

LACI = *Lasiurus cinereus*

TABR = *Tadarida brasiliensis*

General Conclusions and Recommendations

The Paraiso Springs Resort property has oak woodland habitat that offers natural roosting and foraging habitats surrounding the proposed development zones. The proposed development and removal of existing structures poses minimal impact to the local bat fauna. The proximity of plenty of natural habitat features that offer suitable roosting habitat (rock outcrops, old oak trees, etc) precludes the need to provide replacement habitat for bats that may use existing structures for day roosting. Efforts should be taken to prevent the accidental take of animals during structure or tree demolition, including scheduling demolition activities to not occur during the peak breeding season (May-August) and requiring a qualified bat biologist to perform pre-demolition surveys to remove animals that may be present immediately prior to demolition activities.