

**Bat Habitat Assessment**  
**2110 Bay Street Warehouse in Los Angeles, California**

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## Background

Bat populations in Southern California have been declining in recent years due to multiple human-induced pressures, particularly on the coast where bat species lose both roosting and foraging habitat regularly to urban development. Roosts of species that can adapt to human presence are frequently disturbed (deliberately or inadvertently) and colonies are often eradicated. Additional impacts faced by local bat populations are pathogen and pesticide poisoning (from eating insect prey); severe and extensive light pollution that exposes bats to diurnal predators and disperses insect prey, rather than concentrating it; water pollution and mosquito abatement that also affect prey quality and availability; and increasingly frequent wildfires that reduce the prey base and may kill bats directly.

Bats typically have one pup a year. Their low reproductive rate, high juvenile mortality, and long generational turnover make them even more likely to experience population declines in the face of multiple human-induced pressures. Recovery from population declines may take years and requires availability of good quality roosting and foraging habitat. With the loss of natural roosting habitat, anthropogenic roost structures, such as bridges and buildings, are increasingly important to the survival of local bat populations. Because buildings often involve cohabitation of bats and humans, bats are at a much higher risk of disturbance (both accidental and deliberate) and extermination in these situations.

## Site Description

The parcel located at 2110 Bay Street in Los Angeles is located in a commercial zone bound by Bay and Sacramento Streets to the north and south, respectively, and between Santa Fe Avenue and the railroad tracks/Los Angeles River to the west and east, respectively. It contains two buildings. A warehouse (approximately 150 feet by 250 feet) at the north side of the parcel bordering Bay Street, and a smaller building (approximately 30 feet by 40 feet) at the southeast corner of the parcel bordering Sacramento Street. The larger building has a high corrugated metal roof, varied in height and pitch, above wooden rafters with multiple crevices and recessed areas.

## Methods

On 6 October 2019, a site inspection was conducted at the Bay Street parcel, the purpose of which was to assess the property for the presence of bat roosting habitat.

A site inspection is a daytime site visit to examine existing features at a given location for the presence of suitable roosting and/or foraging habitat. On parcels less than a few acres in size, this typically involves a thorough inspection of all accessible structures and an evaluation of the site and surrounding area for foraging. The first component is to determine whether features are present that are suitable for bat roosting and to look for bats, sign (e.g. guano), and listen for audible vocalizations. The second component can provide additional insight about the likelihood of bats occurring in the area. If suitable roosting habitat is found, but bats, sign, or vocalizations are not observed, a follow-up night-time survey is usually conducted to gather additional data, such as presence, roost type and size, and species present.

Biologists evaluating the site did not have permission to access the site, so both buildings were inspected primarily from the entrance and the streets. This precluded a thorough inspection of the buildings' interiors and a follow-up nighttime survey, the latter of which requires appropriate positioning of personnel for determining the exit locations of emerging bats.

Weather conditions were as shown in Table 1:

**Table 1. Weather conditions during the on 6 October 2019 habitat assessment.**

	Start	End	Units
<b>Time</b>	1638	1819	hrs.
<b>Temp</b>	82.9	77.8	°F
<b>Wind (avg)</b>	1.6	3	mph
<b>RH</b>	35.2	33.9	%
<b>CC</b>	0	0	%

### Discussion

The features of the larger building (high corrugated metal roof, varied in height and pitch, above wooden rafters with multiple crevices and recessed areas) all provide suitable day- and night-roosting habitat for bats. The space between the small building and adjacent property, visible from Sacramento Street, is also suitable crevice roosting habitat for bats.

Day roosts are structures that protect bats from predators and the elements during the day. A roost may house an individual bat or a colony. A maternity roost is a type of day roost used by a colony of females that gather to give birth and raise young. Maternity colonies, in Southern California, may be comprised of a few dozen to thousands of individuals of one or more species in a given structure. In human-made structures such as buildings or bridges, these roosts are usually in crevices. A night roost refers to a structure or structural feature (natural or human-made) in which bats roost during the evening between foraging bouts. In addition to crevices, examples of night-roosting habitat include box girders and closure pours of bridges, cavities, corners, culvert walls, and recessed open spaces that are sheltered from the wind. Night roosts are often situated in or near a foraging area and play an important role in the energetics and social interaction of bats. A given structure may serve as any or all of these roost types. Bats may travel significant distances to travel from a high-quality roost to a high-quality foraging area, or they may return to night roost in the same structure used as a day roost, particularly if it is near a foraging area and if there are nursing females present.

Bats are particularly vulnerable to disturbance in maternity colonies and hibernacula, but loss or disturbance of a night roost can also harm bat populations, as can the loss of foraging habitat. While more direct impacts to bats occur through roost removal, destruction, or disturbance, indirect impacts such as the decline of prey base due to loss or modification of foraging habitat can also be substantial. The potential consequences of traveling longer distances to forage include individual mortality or even failure of a maternity colony, as failure to put on sufficient weight may result in the inability to migrate, nurse, or hibernate without starving.

Recent records from bat surveys conducted for the City of Los Angeles, Griffith Park, private landowners, and the Los Angeles County Museum of Natural History's (LACMNH) Backyard Bats Program indicate that at least eight bat species occur in urban and urban edge habitat in Los Angeles County (Remington & Cooper, 2014). Five of these are known to roost in buildings (Table 2). Species accounts for these five species are included below. Mexican free-tailed bats and Yuma bats have the highest potential to occur on site. The Lasiurines have a moderate potential of occurring on site, but are foliage-roosting species. The others have a moderate to low potential of occurring on site.

**Table 2. Bat species detected in and near urban areas of Los Angeles County by S. Remington and LACMNH (from Remington, 2014), Unpublished data from the Los Angeles River and Arts District in 2015 and 2017, and Backyard Bats of Los Angeles County, (NHMLAC, 2019)).**

Common Name	Latin Name	Known to roost in buildings	Documented in/near downtown Los Angeles	Method of Detection
California bat	<i>Myotis californicus</i>	X		A
Yuma bat	<i>Myotis yumanensis</i>	X	X	A, V
Canyon bat	<i>Parastrellus hesperus</i>	X		A, V
Western red bat*	<i>Lasiurus blossevillii</i>		X	A
Hoary bat	<i>Lasiurus cinereus</i>		X	A
Western yellow bat*	<i>Lasiurus xanthinus</i>		X	A
Mexican free-tailed bat	<i>Tadarida brasiliensis</i>	X	X	A, V
Western mastiff bat*	<i>Eumops perotis</i>	X		A

\* California Species of Special Concern

A = Acoustic      V = Visual

The two species shown in yellow, [Mexican free-tailed bat (*Tadarida brasiliensis*) and Yuma bat (*Myotis yumanensis*)], have been observed and recorded acoustically within a quarter mile of this property in the Los Angeles River, and within a half mile in another warehouse to the north (pers. obs.). Ms. Remington was the lead biologist on these projects. Of over 40 sites surveyed in Los Angeles County by LACMNH, Mexican free-tailed bats were documented in every neighborhood surveyed (Ordeñana, 2020, pers. comm.). Although *T. brasiliensis* is not a California Species of Special Concern, this species is known to form large maternity colonies that can be considered significant – and, therefore, protected – under the California Environmental Quality Act (CEQA). Their tendency to roost in large numbers leaves them vulnerable to sudden population declines when a single roost is disturbed. Two known roosts in the area have been demolished within the last three years.

Species identifications are generally made by comparing call recordings with a library of “voucher” calls from known hand-released bats. A variety of detectors were used for the surveys described above, including Anabat, Echometer Touch, and Binary Acoustics detectors. Ms. Remington used Analook software to analyze call files. LACMNH used full spectrum programs for analysis (Ordeñana, 2020, pers. comm.).

Some limitations are inherent in acoustic monitoring and in the analysis of acoustic data and include, but are not limited to, human bias and past experience in data interpretation, as well as the fact that bat species are not equally detectable. Some bats, such as Mexican free-tailed bats (*Tadarida brasiliensis*), emit loud relatively low-frequency echolocation calls that can be recorded from great distances and will be overrepresented in the data, while “whispering” bats, such as Townsend’s big-eared bats (*Corynorhinus townsendii*), emit faint calls that may not be recorded at all. Some species, such as pallid bats (*Antrozous pallidus*), may forage without echolocating at all.

In addition, not all call sequences are identifiable. Different bat species may use similar types of echolocation calls, or the same species may use different types of echolocation calls based on the perceptual task involving, among other factors, the immediate habitat, season, and/or prey species.

Multiple surveys should be conducted whenever possible, because species composition and activity levels recorded during a single nighttime visit to a site cannot be used to extrapolate long-term patterns of presence, colony size, species composition, or habitat use. Each of these may change seasonally or even nightly. Despite these limitations inherent in acoustic monitoring and inherent variability in bat activity patterns, bats are highly vocal animals, producing one to several hundred pulses of sound per second. The data gathered from the acoustic call identifications and concurrent field observations are useful in understanding the behavior and activities of the bats utilizing each site, particularly when data can be collected periodically over time. Exit counts performed by trained biologists, combined with crevice inspection, provide data useful in estimating the number of bats roosting at a given location and ascertaining the presence of maternity colonies.

### Conclusion

As the primary predators of nocturnal flying insects, bats play a vital role in controlling insect populations. They are also known to be dead-end hosts of the West Nile Virus, meaning that – unlike birds – bats do not spread the disease and may play an important role in controlling its spread. Given the introduction of new mosquito species – including disease vectors – into southern California, maintaining healthy bat populations are important in urban environments, particularly near water features, such as the Los Angeles River, that attract multiple mosquito species including recently introduced vector species.

Healthy bat populations rely on secure, stable roosting environments. Bat surveys have not been conducted on this parcel. A thorough inspection of the inside of the buildings and an exit survey should be performed at this site during the maternity season (approximately April through August) prior to demolition to determine whether bats are present at the site. If bats are roosting in either of the buildings on the property, arrangements should be made to humanely exclude them prior to demolition. If either building is occupied by a maternity colony, alternate roosting habitat should be installed prior to the exclusion. Bat surveys, humane exclusions, and installation of alternate roosting habitat should be overseen by a bat biologist with experience conducting them. Upon request, I can provide a list of biologists qualified to perform these tasks.

### Species Accounts

California bat (*Myotis californicus*) – Family Vespertilionidae (Evening bats)

This is a tiny (weight is slightly more than a penny) species that is known to roost colonially or individually in a variety of natural and human-made structures including caves, mines, rocky outcrops, trees (e.g. under exfoliating bark), buildings, and bridges. They eat small moths, flies (including mosquitoes) and other insects. In parts of their range, which includes most of western North America, they are known to mate in the fall, store sperm over the winter, and give birth to a single pup in spring after forming maternity colonies in early spring. Mating may occur during the spring in California. Although known to use human-made structures for roosting, this species is more common in open space and urban edge habitat than in large urban centers in coastal southern California (pers. obs.). The LACMNH Backyard Bats Study found this species to be widespread in Los Angeles County (Ordeñana, 2020, pers. comm.)

#### Yuma bat (*Myotis yumanensis*) – Family Vespertilionidae

This small, urban-adapted bat is one of the two most common species occurring in urban coastal southern California. Its distribution is strongly correlated with the presence of permanent water sources. This species specializes in the capture of aquatic emergent insects (including caddis flies, flies, midges, small moths and small beetles), but will forage in other habitats, as well, when insect abundance is elsewhere. This species mates in the fall and gives birth to a single pup in spring. Yuma bats are colonial, forming maternity colonies of anywhere from a few individuals to thousands. They often roost in natural or human-made structures near their preferred foraging habitat. The LACMNH Backyard Bats Study found this species to be widespread in Los Angeles County (Ordeñana, 2020, pers. comm.)

#### Canyon bat (*Parastrellus hesperus*) – Family Vespertilionidae

This tiny species is similar in size to the California bat, although some individuals weigh less than a penny, but is known to give birth to twins, meaning that pregnant females of this species forage while carrying more than 2/3 of their body weight. This species is known to roost alone or in small groups, often the first bats to emerge at dusk to forage on small, swarming insects, such as flying ants, fruit flies, and mosquitoes. They are common in rocky canyons, but were found to be widespread in Los Angeles County by LACMNH Backyard Bats Study (Ordeñana, 2014) and (Ordeñana, 2020, pers. comm.).

#### Mexican free-tailed bat (*Tadarida brasiliensis*) – Family Molossidae (Free-tailed bats)

This fast-flying, long-distance foraging species is one of the two most common bats found in urban southern California. Throughout their range, they form large maternity colonies that vary in size from a few dozen to millions of individuals. In California, the largest known colony of this species is approximately a quarter of a million individuals. In southern California, the largest colonies are comprised of approximately 25,000 individuals. Their tendency to congregate in large numbers is tremendously beneficial to people because they control insect populations (a colony of 1,000 individuals may consume 25 lbs. of insects nightly in the spring and summer), but this also poses a risk to the bats. If a single colony is disturbed or exterminated, this could cause a dramatic population decline. Bats, in general, are long-lived species, living for decades. Their maternity colonies may contain dozens of generations, and – with them – the long-term knowledge of the surrounding area and conditions, passed down from mothers to pups (Tartarian, 2020, pers. comm.). Free-tailed bats typically mate in early spring and give birth in late spring or early summer. LACMNH documented Mexican free-tailed bats in every neighborhood surveyed (Ordeñana, 2018) and (Ordeñana, 2020, pers. comm.)

#### Western mastiff bat (*Eumops perotis*) – Family Molossidae

This is the largest of the four free-tailed species known to occur in coastal southern California, and – with a nearly two-foot wingspan – is the largest species occurring in the United States. Despite their large size, this species is rarely seen by people because they tend to roost in cliff faces and forage high above the ground. When they do form roosts in urban areas, they are often quickly discovered and often exterminated. This species is a California species of Special Concern (CDFW, 2019). The closest locations to downtown Los Angeles where LACMNH documented this species were the L.A. Zoo and Los Feliz (Ordeñana, 2014) and (Ordeñana, 2020, pers. comm.).

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Figure 1 Bay Street Project Site Plan and Surrounding Planned Buildout, Location and Vicinity Map





Figure 2 Location of Photo Points and Corresponding Photos