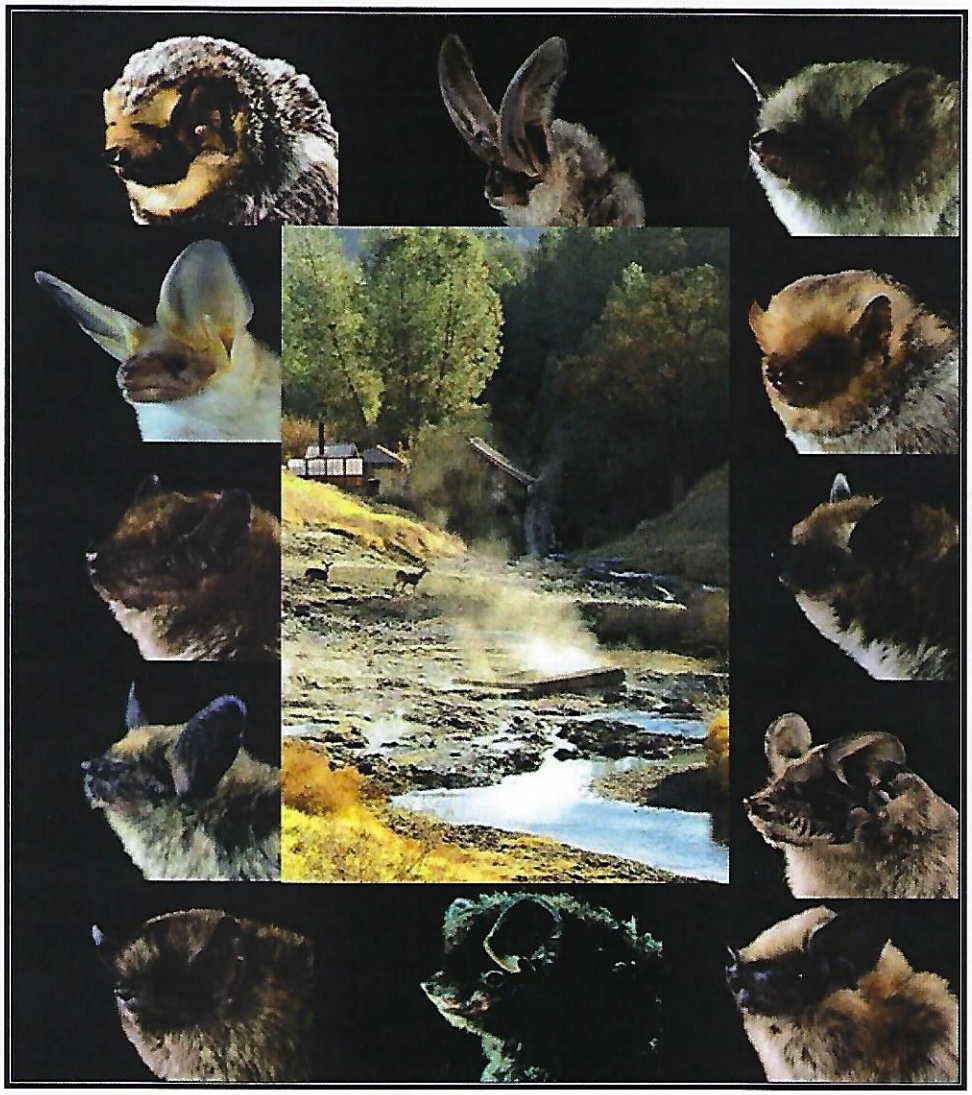
Bats of the
Wilbur Hot Springs' Nature Preserve



June 14, 2016

Bats of the Wilbur Hot Springs' Nature Preserve

Wilbur Hot Springs' Nature Preserve (WHSNP) is a 1,560-acre ecological reserve tucked away in the rolling hills of the California coast range approximately 90 miles north of San Francisco. Formerly an active mining and hunting area, the lands of the reserve were purchased in 1999 by Dr. Richard Miller, founder and owner of Wilbur Hot Springs Resort, who placed a conservation easement on the property to preserve the natural ecosystems around the resort. The Preserve is primarily central oak woodland habitat. Common wildlife of the area include deer, coyotes, badgers, bobcat, gray fox, golden eagles, red-tailed hawks, great blue herons, killdeer, wild turkeys, and a rich variety of songbirds.

Many bats also occur at WHSNP. However, because bats are active only at night they are infrequently seen and little understood. This document presents descriptive information about the bats found within the Preserve to enhance the natural experience of interested visitors.

Bats that occur at WHSNP

Based on capture/release and acoustic call recognition studies conducted by bat biologists at WHSNP, the following bat species are known to occur within the reserve:

Common Name	Scientific Name
• Pallid Bat	(*Antrozous pallidus*)
• Townsend's big-eared bat	(*Corynorhinus townsendii*)
• Big brown bat	(*Eptesicus fuscus*)
• California myotis	(*Myotis californicus*)
• Yuma myotis	(*Myotis yumanensis*)
• Canyon bat	(*Parastrellus hesperus*)
• Brazilian free-tailed bat	(*Tadarida brasiliensis*)

In addition, the following species are likely to occur at WHSNP based on their natural range distributions and known habitat use patterns:

• Silver-haired bat	(*Lasionycteris noctivagans*)
• Western red bat	(*Lasiurus blossevillii*)
• Hoary bat	(*Lasiurus cinereus*)
• Long-eared myotis	(*Myotis evotis*)
• Little brown bat	(*Myotis lucifugus*)
• Fringed myotis	(*Myotis thysanodes*)
• Long-legged myotis	(*Myotis volans*)

Of particular note is the Townsends' big-eared bat, a species currently identified by the California Department of Wildlife as a Candidate for listing as Threatened or Endangered. The pallid bat and western red bat are also designated as Species of Special Concern.

Species Profiles for WHSNP Bats

For those interested in learning more about these bats, this section provides photos and information on their ecology and behavior including preferred foraging habitats, roost sites, diet, and echolocation call types. (All photos from Merlin Tuttle Bat Conservation; used with permission).

The **pallid bat** (*Antrozous pallidus*) is commonly found foraging over open shrub-steppe grasslands, oak savannah grasslands, open Ponderosa pine forests, talus slopes, gravel roads, lava flows, fruit orchards, and vineyards throughout California. It roosts in rocky outcrops and cliffs, caves, historic abandoned mines, and trees (*e.g.*, basal hollows of coast redwoods and giant sequoias, bole cavities of oaks, exfoliating Ponderosa pine and valley oak bark, deciduous trees in riparian areas, and fruit trees in orchards). It is also frequently found on bridges and other manmade structures (incl. barns, porches, bat boxes, and human-occupied as well as vacant buildings). Roosts may include single bats, small groups (2-20 bats) or large colonies (100's of individuals).

Pallid bats are opportunistic insectivores/carnivores that glean prey from the ground and vegetation, but they also hawk insects on the wing. Prey species include antlions, beetles, centipedes, cicadas, crickets, grasshoppers, Jerusalem crickets, katydids, moths, praying mantis, scorpions, termites, and occasionally geckos, lizards, skinks, and even small rodents. Pallid bats forage largely by passive listening for prey generated sounds (e.g. movement in leaf litter) and vision, but also use short, mid frequency (60-25 kHz) calls, to orient within and maneuver through the vegetation.

The **Townsend's big-eared bat** (*Corynorhinus townsendii*) is distributed throughout California in coniferous and mixed mesophytic (moderately moist) forests, deserts, native grasslands, riparian communities, active agricultural areas, and coastal habitat types. It roosts mainly in caves and historic abandoned mines, but also is found in buildings, bridges, rock crevices and hollow trees. It forages primarily on moths which include over 90% of its diet. Preferred foraging areas include edge habitats along streams adjacent to and within a

variety of woodlands. It uses short, broken, mid frequency (60-21 kHz) FM calls to locate and capture prey.

The **Big brown bat** (*Eptesicus fuscus*) is found in most habitats throughout California, roosting in buildings, historic abandoned mines, and bridges, and other man-made structures, but also in caves, rock crevices, tree and cactus hollows and even abandoned swallow nests. It feeds mainly on hard-bodied insects including beetles, bugs, aphids, flies, moths, bees and wasps. It uses mid frequency (57-27 kHz) calls while hawking insects in tree canopies, over meadows, or along water courses.

The **silver-haired bat** (*Lasionycteris noctivagans*) is a forest-associated species distributed in California primarily in the northern counties of the state and at higher elevations in the southern and coastal mountain ranges. It is found primarily in mature and old growth coniferous and mixed coniferous forests with Douglas fir, ponderosa pine and black oak. It roosts almost exclusively in trees, but winter roosts also include rock crevices, historic abandoned mines, caves, buildings, and infrequently bridges. The diet of this species includes a variety of insects, but is primarily comprised of moths. It uses mid frequency (55-26 kHz) calls to find and capture its prey and maneuver through the forests.

In California, the **western red bat** (*Lasiurus blossevillii*) is found most commonly in low elevation riparian and woodland habitats scattered throughout the state, but a few records have been documented at higher elevations (up to 8000 ft) in the Sierra Nevada. It roosts exclusively in trees, within the foliage. Insect prey includes true bugs, beetles, bees and wasps, flies and moths that are captured in aerial pursuit over ponds and waterways. Western red bats use mid frequency (60-40 kHz) calls for prey capture and maneuvering.

The **hoary bat** (*Lasiurus cinereus*) is a tree-associated species found primarily in forested habitats from sea level to 13,200 ft in California. It roosts exclusively in trees, within the foliage, in both coniferous and deciduous trees. Infrequently, it may roost in caves, beneath ledges, in woodpecker holes and in squirrel's nests. Moths comprise its principal diet, but it may also take other insects including dragonflies and beetles. Foraging occurs mostly over the tree canopy. Hoary bats use mid-to-low variable frequency (41-18 kHz) calls to maneuver through their forested habitat and to locate insects at long distance above the trees.

California myotis (*Myotis californicus*) inhabit the drier area of California, usually below 6,000 ft, but usually near water. They commonly roost in historic abandoned mines, caves, buildings, rock crevices, hollow trees, under bark and occasionally on bridges. Their diet includes small flying insect, commonly flies, moths, spiders, and beetles that it captures using slow maneuverable flight along the margins of vegetation clumps, tree canopies and in the open high above the ground. They use short high frequency (100 – 50 kHz) echolocation calls.

The **Long-eared myotis** (*Myotis evotis*) is primarily a forest associated species found in mixed hardwood/conifer forest and montane conifer forest in northern California, and in pinyon-juniper, mesquite scrub, and pine/oak woodlands in southern California. They roosts in caves, historic abandoned mines, trees, rock crevices, buildings and bridges, usually close to forested habitat. Individuals use both substrate gleaning and aerial pursuit to capture prey, foraging in forest-edge habitats along rivers and streams, over ponds, and within cluttered forest environments. Their diet includes moths, small beetles and flies. Long-eared myotis use short, high frequency (80-40 kHz) echolocation calls.

Little brown bats (*Myotis lucifugus*) are found in the higher elevation and more northern portions of California, and are generally associated with coniferous forests. They commonly roost in buildings, but also are found in trees, under rocks, in rock crevices, caves, historic abandoned mines and on bridges. They forage preferentially in open areas among vegetation and along water margins, and sometimes over water. Their diet consists of a variety of small aquatic insects including caddis flies, midges, mayflies, and mosquitoes, but also lacewings, flies, small moths and small beetles. They use medium frequency (70-35 kHz) echolocation calls.

Fringed myotis (*Myotis thysanodes*) are found throughout California from low desert scrub to high elevation coniferous forest. Roost sites include historic abandoned mines, caves, trees, buildings and bridges. This bat forages in and among vegetation, along forest edges and over the forest canopy. Both aerial capture and gleaning are used. Beetles, moths, spiders, crickets and other insects are taken. Short mid -to-low frequency (75-13 kHz) echolocation calls with variable start frequencies are used.

Long-legged myotis (*Myotis volans*) are found throughout California from the coast to high elevation in the Sierra Nevada. However, they are absent from the Central Valley and the lower desert regions in the southeastern parts of the state. They roost largely in hollow trees, but also in rock crevices, historic abandoned mines, buildings and on bridges. Moths comprise the principal food, but beetles, flies, termites and other insects are included. Foraging usually occurs in open area, frequently above the canopy. Long-legged myotis use very broadband (90-27 kHz) echolocation calls while foraging.

Yuma myotis (*Myotis yumanensis*) are typically found in a wide variety of habitats but mostly in association with lower-to-mid elevation ponds, reservoirs and open areas in streams and rivers where they feed on emergent aquatic insects such as caddis flies and midges. They roost in buildings, trees, historic abandoned mines, caves, bridges and rock crevices. They use moderate-length, mid-range broadband (72-45 kHz) calls to their insect prey almost exclusively over water.

Canyon myotis (*Parastrellus hesperus*) inhabit the deserts and dryland regions of California in lower and upper Sonoran desert and coastal sage scrub habitats, usually in association with canyon and rocky terrain. Roosts are found primarily in rock crevices, historic abandoned mines, caves buildings and infrequently, on bridges. Their food includes small moths, leafhoppers, flies, gnats, mosquitoes, flying ants etc. which they capture on the wing in open areas. Their flight is usually slow and agile. Canyon bats use strong, high frequency (100-45 kHz) calls to locate and accurately track their prey.

Brazilian free-tailed bats (*Tadarida brasiliensis*) are found throughout California from low desert to over 10,000 ft. in the Sierra Nevada. It is the most common species in the central valley with a colony of up to 250,000 inhabiting the causeway infrastructure between Davis and Sacramento. Besides bridges, this species roosts in cliff faces, bridges, buildings, historic abandoned mines and caves. Prey species mainly include moths, but other open air insects may also be taken. Brazilian free-tailed bats are primarily open area aerial predators using straight line pursuit. They have unique echolocation calls that change from mostly long flat CF components (approx. 28 kHz) during the search phase to short broadband calls (60 – 25 kHz) during the terminal buzz contact phase.