Bat survey data conducted in San Diego County between 2002-2019

Sampling methods

When bats were captured, captures were done using fine mesh mist nets (Avinet, Portland, Maine) and handheld butterfly nets. All surveys were conducted under the California Department of Fish and Wildlife permit SC#2645 and were approved by the Western Ecological Research Center Animal Care and Use Committee in association with the University of California, Davis. All statistics from survey data were calculated in R v3.5.2 [47] and R Studio v1.2.5 [48].

ANABAT bat detectors—1 to 7 detectors were deployed at 129 of the 152 sampling sites to record bat vocalizations in this study. Detectors were placed approximately one meter above the ground on T-posts or strapped to trees or vegetation with microphones oriented towards expected bat flyways. Expected bat flyways included the edge of riparian reaches, the edge of oak and/or coniferous woodlands, meadow edges, along scrubby ridgelines, and the edges of waterways. The detectors were left in place to passively record bat vocalizations for a minimum of one night. In rare cases, the detectors were left in place for an extended period (i.e., up to 31 consecutive nights at a sampling site in the Coronado Cays sampling area). The detectors were set to automatically turn on at sunset and turn off at sunrise. Detectors automatically recorded bat vocalizations as well as other sounds such as insect noise. After the detectors were retrieved from the field, the recorded bat vocalization data were downloaded and reviewed in the laboratory and identified to species level when possible [49]. All files were manually reviewed using AnalookW software, multiple versions (Titley ElectronicsScientific, Queensland, Australia). No filters were used and all files were manually vetted during the review process.

Day roost surveys and exit counts—Diurnal inspections of known or potential bat day roosts were made opportunistically. Inspections involved peering into crevices and cavities where bats were visible, usually with a flashlight. Occasionally, bat roosts such as mines and flume tunnels were entered and bats were sometimes captured using a handheld butterfly style net to verify the species, age, sex, and reproductive status. On 112 occasions, bats were observed as they exited from a day roost. Bats were counted as they exited roosts using the unaided eye and clicker counters.

Night roost surveys—Inspections of sampling sites where bats were roosting at night were made opportunistically. A flashlight was used to illuminate night roosting bats so species status could be verified.

Fine mesh mist nets—Mist nets were erected in expected bat flyways including over small ponds, across creeks, in vegetation flyways, and under woodland canopies to capture flying bats [50]. All mist nets used were 2.6 meter-tall, single high-nets. Mist nets were used on 90 surveys. The number of mist nets used was dependent on the number of appropriate bat flyways at any given sampling site during a survey night. Mist nets were opened at approximately sunset and were continuously attended for three hours. After each three-hour mist netting period the nets were closed and taken down. Species, age, sex, and reproductive condition were determined for all captured bats. Most bats were photographed and all were released immediately after being processed.

The unaided ear—Listening for audible bat vocalizations with the unaided ears always accompanied mist netting but was also conducted independently of other survey techniques on 107 occasions.

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