Methods for Estimating Colony Size of Mexican Free-tailed Bats

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Carlsbad Cavern hosts a colony of several hundred thousand Mexican free-tailed bats (*Tadarida brasiliensis* mexicana). Colony sizes, population behavior, roost geography, repeatability of methods, and cost efficiency have all been problematic for obtaining accurate abundance estimates. Past methods have varied from gross ocular counts to complex calculations using video and still photography. No previous method has provided a measure of statistical precision nor has any method proven valuable as an index to trends. Investigators and managers need a variety of procedures from which to choose so that consistent and useable data can be obtained. The poster presents our progress in developing reflective infrared photography as a means of estimating colony size and assessing long-term trends in large colonies of Mexican free-tailed bats. Using still black/white infrared images taken from fixed photomonitoring stations in the roost, with photographs repeated on consecutive days, colony size is estimated from the area of cave ceiling covered by bats. For example, using a roost density of 2,153 bats per square meter and the mean area of ceiling covered with bats, we estimated there were 353,000 (+1- 22,000) resident bats roosting in Carlsbad Caverns in fall 1996. We believe that immigration and emigration contributed to increasing trends in area estimates during the spring monitoring and decreasing trends in fall estimates. With 1997-99 refinements, including monitoring flight noise, developing ceiling contour maps, and carefully timing additional photographic sessions, this method should provide valid estimates of annual population trends.