Long-term monitoring of bat populations associated with extensive riparian restoration in Las Vegas Wash, Clark County, Nevada

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ABSTRACT

This is a report of a long-term continuous monitoring program that was initiated in January 2004 to establish baseline inventory and habitat use of bats in Las Vegas Wash. This study provides baseline condition in a currently highly disturbed riparian corridor, which is in the beginning stages of an extensive riparian restoration project. Continued monitoring through the restoration process will be able to document the effects of restoration on the resident and transient bat community. Three acoustic monitoring stations were established at approximately 1.6 km intervals in the wash. Each station houses an Anabat II detector and a Compact Flash Zero Crossing Analysis Interface Module (Titel Electronics). Baseline data was collected by a 5-watt solar panel, which collects data all night every night. Locations were selected to reflect the variations in habitat composition and structure found within the wash. Through 2005, 16 species of bats were previously known from a single historic record and six species were not known to occur within Las Vegas Wash, including a species new to the State. Patterns of occurrence and intensity of use and foraging. Marked differences of use by various species have been found among the three monitoring sites. Continued monitoring will allow determination of annual variations in occurrence and use due to changing weather patterns as well as the effects of riparian restoration.

INTRODUCTION

Prior to 1994, all records of bat occurrence were based on shooting, finding dead animals, or locating a roost site (Hall, 1946). In 1954, mist nets were introduced to North American bat work (Darquist, 1954), resulting in the ability to conduct focused surveys. Little was known about bat occurrence and distribution in southern Nevada until mist net studies were initiated in 1964. These studies were confined to small water holes that could be effectively netted. This site study was confined to the fringes of the Las Vegas Valley (Fig. 1) and beyond. Although mist nets provide an enhanced ability to study located bats, there is considerable bias inherent in their use (Kurtz and Kurtz, 1988). Technological advances over the last decade have produced acoustic equipment capable of recording and playing the time frequency structure of echolocation calls which then allows identification of the vocalizing species (O’Farrell, 1997; O’Farrell et al., 1999). Acoustic surveys have limitations, particularly for quiet species (O’Farrell and Gannom, 1999). However, significantly more species can be documented by acoustic means than standard capture methods (Kauki et al., 1996; O’Farrell and Gannom, 1999; Ochsa et al., 2000).

The purpose of the present study is to provide a baseline of knowledge on temporal changes in inventory and differential habitat use within Las Vegas Wash (Fig. 2). Because the baseline is being acquired during the initial phase of an extensive riparian restoration program in the Las Vegas Wash, the effects of the program can be documented on resident and transient bat populations. This is a progress report of the initial phase of baseline collection from January 2004 to August 2005.

RESULTS AND DISCUSSION

A total of 16 species of bats have been recorded to date (Table 1). Eight of the species are listed as Federal Species of Special Concern, four of these are State-listed Sensitive and four are State-listed Protected. Six species have never been recorded in Las Vegas Valley: Mystes cibocum, Myotis thysanodes, Myotis yumanensis, Lasius compressifrons, Lasius minimus, and Lasiurus megalurus. Lasiurus californicus was known from a habitat roost in Hemenway’s mine near the wash that was permanently closed by 1986 (O’Farrell, 1997). Lasiurus megalurus is a species that has never been found in southern Nevada by O’Farrell et al., 2002). Nyctinomops macrotis was known from a single animal found in Henderson (Bradley et al., 1960). Recent acoustic surveys have documented autumn occurrence in the Upper Muddy Valley (Williams, 2001) and Kyle Canyon (O’Farrell, 2002). Eumops perrotii was known from a single animal found in southern Las Vegas Valley (Bradley and O’Farrell, 1987). Recent acoustic surveys have documented the late summer occurrences in Kyle Canyon (O’Farrell, 2002).

Differences are apparent between the three station locations in species composition and use (Table 1). Fifteen species were found at the Downstream location, lacking 1 phyllostomid. Thirteen species were found at the Midstream location, lacking M. californicus, M. thysanodes, and M. macrotis. Differences were found at the Upstream station, lacking J. phyllostomus and M. californicus. The Upstream station recorded 45% of the total minutes of bat activity, whereas 20% for Midstream and 35% for Downstream habitats. Total activity declined for corresponding months from 2004 to 2005.

Table 1: Summary of species detected and the number of files, number of calls, and the number of minutes of bat activity recorded at each of the acoustic monitoring stations in Las Vegas Wash. January 2004 – August 2005.


REFERENCES

The pattern and magnitude of activity through the night is variable among species as well as among monitoring locations (Fig. 7). A typical pattern is a peak of activity within the first hour of the night with decreasing activity through the remainder of the night. Usually in summer, there may be a second smaller peak near sunrise. Some species demonstrate the major peak of activity later in the night. An example of this is Vespertilionidae, which is most prominent at the Midstream station during the month of March 2004. Noctilio borealis is a species of the Las Vegas Wash station demonstrating prolonged and high level of activity throughout the night during the summer. Current, these patterns are being analyzed for all species and correlated to various aspects of weather including temperature, relative humidity, wind and barometric pressure. A custom linear intensity tight meter connected to a data logger at the Upstream and Downstream stations may allow an evaluation of the effects of light levels on activity.

It is clear from the study to date that continuous acoustic sampling has allowed an unprecedented look at bat presence, activity, and habitat use within Las Vegas Wash. The database covers more than 1.5 years and provides a detailed assessment of the resident and transient bat community. There is evidence of substantial annual variation in species occurrence and patterns of use. A long-term database will provide an understanding of the basic dynamics of the bat community and enable the assessment of future progress in riparian restoration.

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