Final Report

Status and long-term monitoring of the gray bat (*Myotis grisescens*) colony in Pittsburg, Kansas

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Introduction

The gray bat (*Myotis grisescens*) is a federally listed endangered species that inhabits caves in the southeastern United States (Decher and Choate 1995). A breeding colony of gray bats was discovered in the stormwater system of Pittsburg, in Crawford County, Kansas in the early 1960s (Hays and Bingman 1964, Choate and Decher 1996). This colony represents the northwestern limit of the species' geographic range, and is the only known breeding colony in Kansas (Martin 2007, Sasse et al. 2007). The Pittsburg colony is unusual because gray bat colonies are almost exclusively limited to caves; use of stormwater systems is rare (Decher and Choate 1995, Martin 2007). The accessibility of the Pittsburg stormwater system has permitted researchers to intermittently monitor abundance, arrival and departure dates since the 1960's. However, the colony has not been consistently monitored since 1999 (Robertson 2003), and the current status of the colony was unknown.

White-nose syndrome is an infectious disease of bats caused by the pathogenic fungus *Pseudogymnoascus destructans* (Coleman 2014). First reported in eastern North America in 2006, white-nose syndrome has resulted in high mortality rates in populations of at least six species of bats. White-nose syndrome has been detected in 29 U.S. states, including Missouri and Arkansas, where individuals from the Pittsburg gray bat colony likely hibernate. White-nose syndrome was first detected in hibernating gray bats in 2012 (USFWS 2012). The potential effects of white-nose syndrome on gray bats are poorly understood. However, gray bats may be especially vulnerable to the disease because large numbers of bats congregate in a relatively small number of hibernation caves during winter (Martin 2007, USFWS 2012, Powers et al. 2016). Biologists have speculated that white-nose syndrome could spread rapidly through gray bat populations, with the potential to reverse the positive population trends that resulted from prior conservation efforts.

White-nose syndrome has not yet been detected in Kansas, and it is unclear whether the Pittsburg gray bat colony has been affected by the disease. The objectives of our study were to 1) determine the current status of the Pittsburg gray bat colony, 2) establish a protocol for long-term monitoring, 3) test the Pittsburg sewer system for the presence of *Pseudogymnoascus destructans*, and 4) identify research priorities for future studies.

Methods

Abundance estimates: We estimated the Pittsburg gray bat colony size, and documented seasonal changes in abundance using a video monitoring system. Bats were recorded emerging from the two known roost entrances at least twice per week from May 24 through October 25, 2017. A single observer used an infrared camcorder with two external infrared lamps to record bats from approximately 30 min before dark for two hours, or until 15 minutes had elapsed with no bats emerging. The camera and lamps were mounted on a tripod, which was positioned perpendicular to the storm drain entrance and out of the flightpath of the bats. During recording, the entire entrance was kept in the field of view.

To facilitate counts, recordings were enhanced using video-editing software, and played back at half speed. A single observer used separate tally counters to count the number of bats exiting and entering the storm drain entrance. Nightly counts were estimated as number of bats entering subtracted from the number exiting.

Roost locations: We made a limited number of exploratory visits inside the Pittsburg stormwater system to confirm the presence of gray bats and assess their use of historic roost sites. We explored the north site (Lincoln Park), the south site (Potlitzer), and a central site near the intersection of Forest and Walnut where gray bats have historically roosted. We also visited newer portions of the Pittsburg storm drains, including the entrances near Schlanger Park and Deramus Park. To minimize disturbance, we did not approach or attempt to count bats at active roosts.

Trapping & banding: We used a harp trap to capture bats as they emerged from the north entrance on October 9 and the south entrance on October 20. Standard biometric and demographic data were collected from each bat, including species, sex, reproductive condition, age class, mass, and forearm length. We began banding gray bats in the fall using bands provided by the USFWS. We visually inspected bats for evidence of WNS, but did not swab using WNS detection kits because WNS is unlikely to be detected in summer.

Results

From May 24 through July 7, the population size was relatively stable, with approximately 220 bats counted per night at the south entrance Fig. 1. During the first week of July, the number of bats at the south entrance began steadily increasing, until we counted 1237 on July 25. Bats began moving to the north entrance during the last week of July. The number of bats at the north entrance steadily increased through August, reaching a high of 1632 by September 11 before gradually declining. No bats were detected during emergence counts by the last week of October.

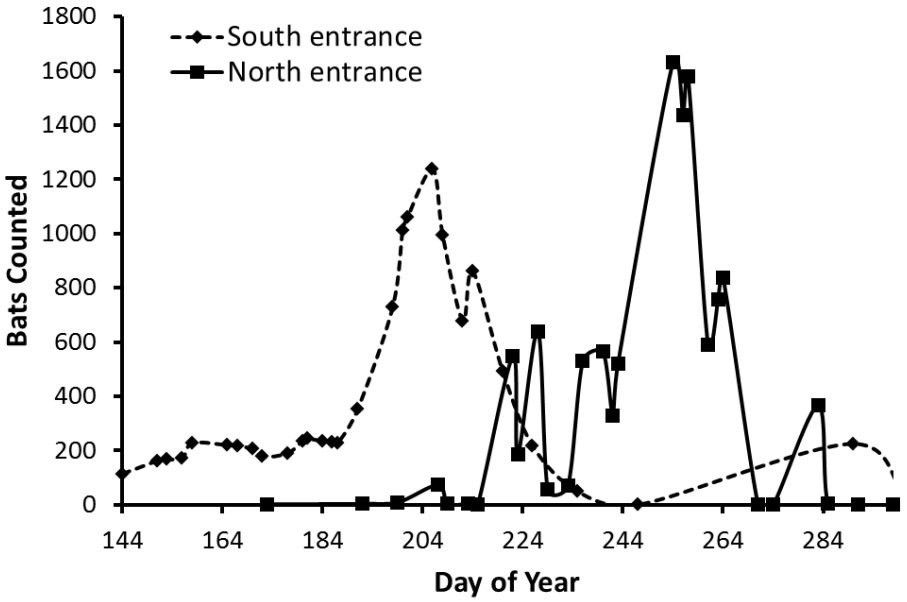

Figure 1. Number of gray bats (*Myotis grisescens*) recorded emerging from the south (KG&E) and north (Lincoln Park) entrances of the Pittsburg stormwater system from May 24–October 25, 2017. Points represent individual counts.

We detected bats at all three of the historic roost sites. At the north site we observed staining on the substrate where bats had previously been documented, although no bats were observed on our

initial visit during the first week of June. We also observed three bats at an undocumented site near the north entrance but were unable to identify them to species. Bats were present in the central and south sites in early June and the last week of July. Bats were not observed in the sections of the stormwater system near Schlanger and Deramus parks.

Of the gray bats we banded, 31 were male and 3 were female. One male bat was previously banded in 2013 by Lynn Robbins. We did not find evidence of WNS on any of the captured bats. See attached document for capture and band data.

Conclusion and future work

Our findings indicate that the Pittsburg gray bat colony has persisted. The maximum estimated colony size (1632) is consistent some historic estimates, but is lower than estimates from 1998 and 1999 of >2500 (Robertson 2003). However, longer-term monitoring will be necessary to determine population trends. The skewed sex ratio we observed may reflect the fact that bats were banded in October, after most females had departed for hibernacula.

It isn't clear whether the colony has been affected by WNS. We did not observe fungal growth or characteristic scarring associated with WNS on any of the captured bats. However, we did not sample bats in winter or early spring, when WNS is likely to be detected. Additional testing is needed to determine whether Pd is present in the Pittsburg stormwater system, or whether the gray bat colony has been affected by WNS.

We will continue monitoring the Pittsburg gray bat colony using emergence counts and banding. In winter, 2018, we will search the stormwater system for hibernating bats. If bats are present during hibernation, we will sample them for WNS using kits provided by the USGS National Wildlife Health Center. We will also test bats for WNS as they arrive at the roost sites from hibernacula in March 2018.

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