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INTRODUCTION



Photo R. Babb

Bats are a diverse and fascinating group of species that fill a variety of important ecological roles. Insectivorous (i.e., insect-eating) bats are the main predator of night-flying insects, offering substantial pest control. Other bats are nectar feeders and help pollinate and distribute seeds for plants, such as saguaros and agave.

However, many bat species are in serious decline. Global threats to bats include loss of habitat, noise and light pollution, wind turbines, intentional disturbance by humans, and white-nose syndrome (WNS). WNS is a disease that affects hibernating bats and is caused by a fungus, *Pseudogymnoascus destructans*.

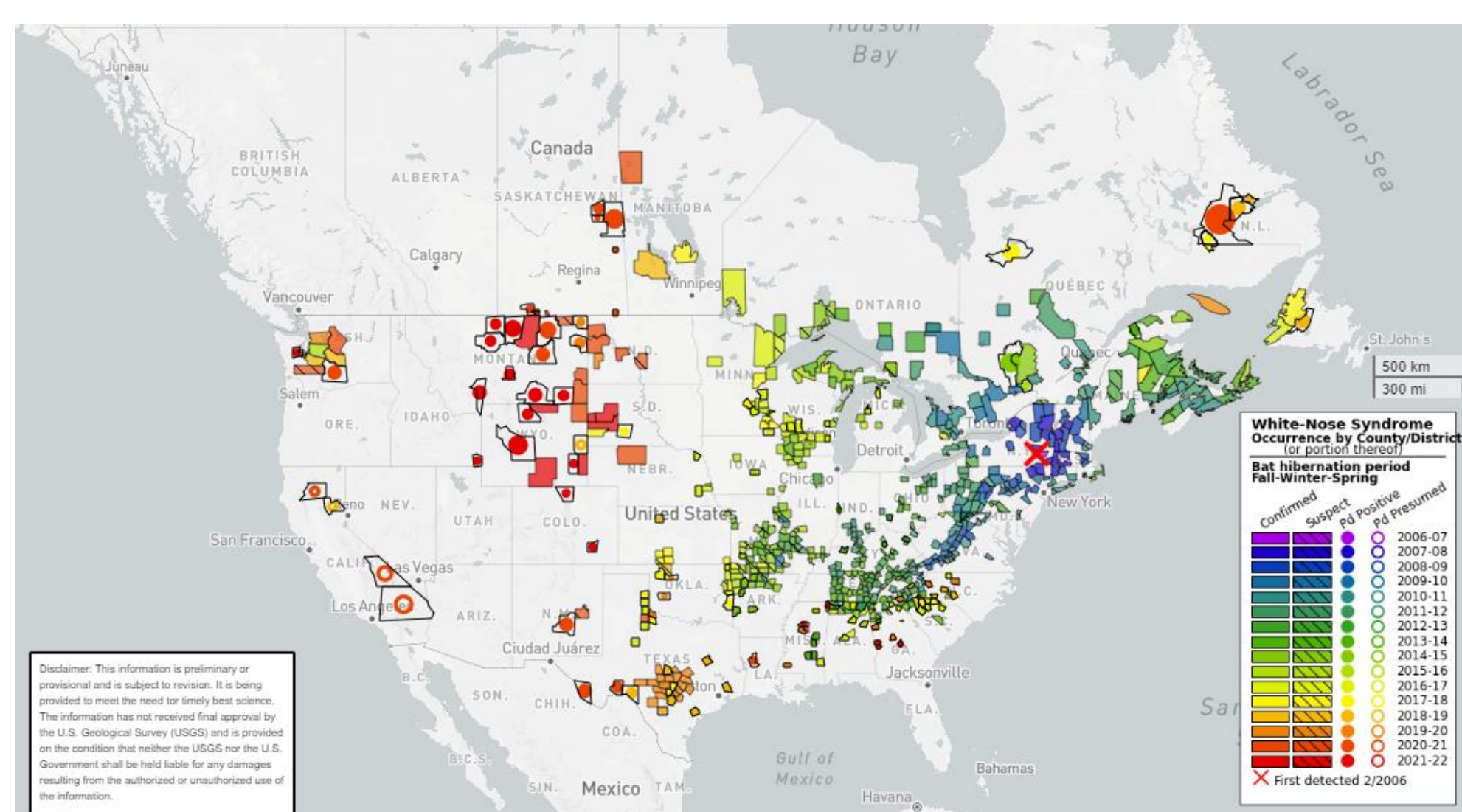


Figure 1. The latest map of white-nose syndrome occurrence across North America and Canada.

OBJECTIVES

1. The overall objective of the McDowell Sonoran Conservancy's bat project is to monitor and maintain bat populations in the McDowell Sonoran Preserve.
2. Particularly, we monitor the maternity roost of a sensitive bat species, the Townsend's big-eared bat, for population declines and WNS.

METHODOLOGY

The study area for bat roost monitoring is Dixie Mine, an old mine on the east side of the McDowell Mountains on the border between McDowell Sonoran Preserve and McDowell Mountain Regional Park (Figure 2). Roost surveys of Dixie Mine consist of emergence counts, acoustic monitoring, and captures. The protocol was developed with our research partner Dr. Marianne Moore.

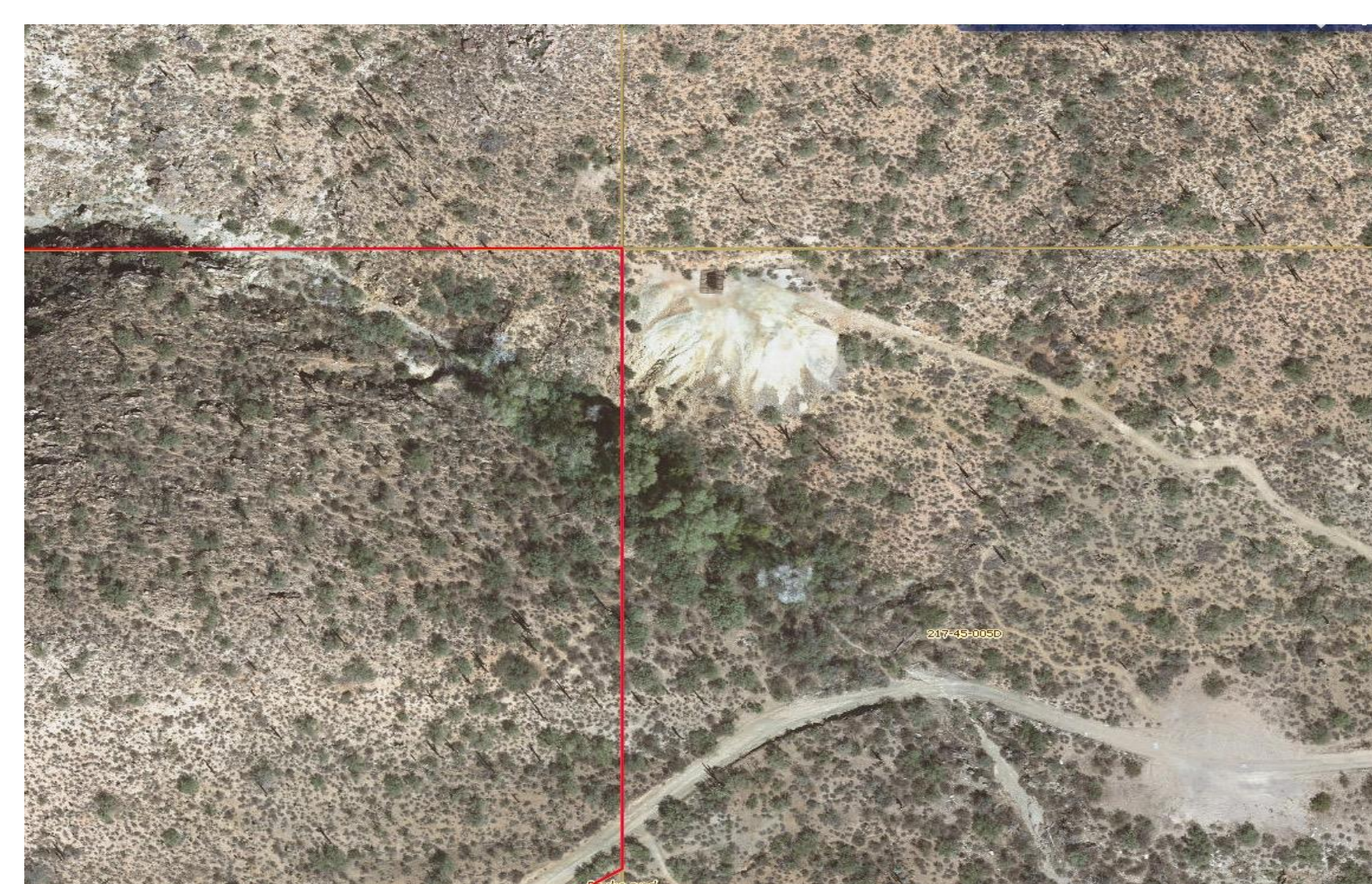


Figure 2. Dixie mine study area. Scottsdale's McDowell Sonoran Preserve is to the west and McDowell Mountain Regional Park is to the east.

To maintain consistency, video equipment, IR lights, and acoustic recording devices are placed at the same location and angle during every survey (Figure 3). Moonlight can influence bat activity, so surveys are conducted within 4 days of the new moon. Recording starts 30 min before sunset until two hours after sunset, for a total of 2.5 hours.

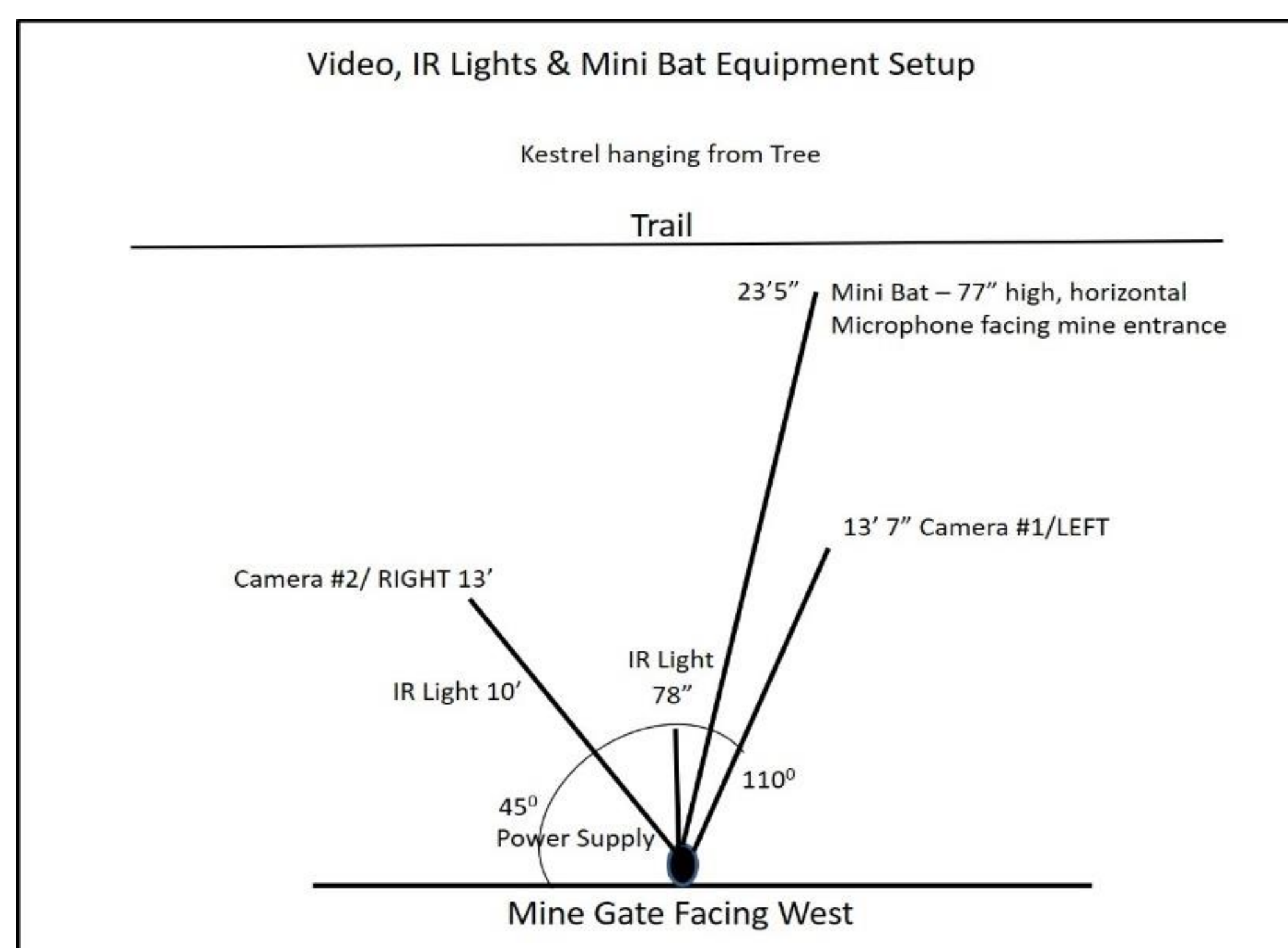


Figure 3. Diagram of video cameras, IR lights, 12V battery pack, and acoustic monitor placement at Dixie Mine.

RESULTS

From May 2019 – June 2022 we conducted monthly bat emergence counts at Dixie Mine, and are currently analyzing the three years of emergence count data. Results from the three-year study show that bats were observed emerging from the mine during most months with very little activity observed in mid-winter (Figure 4).

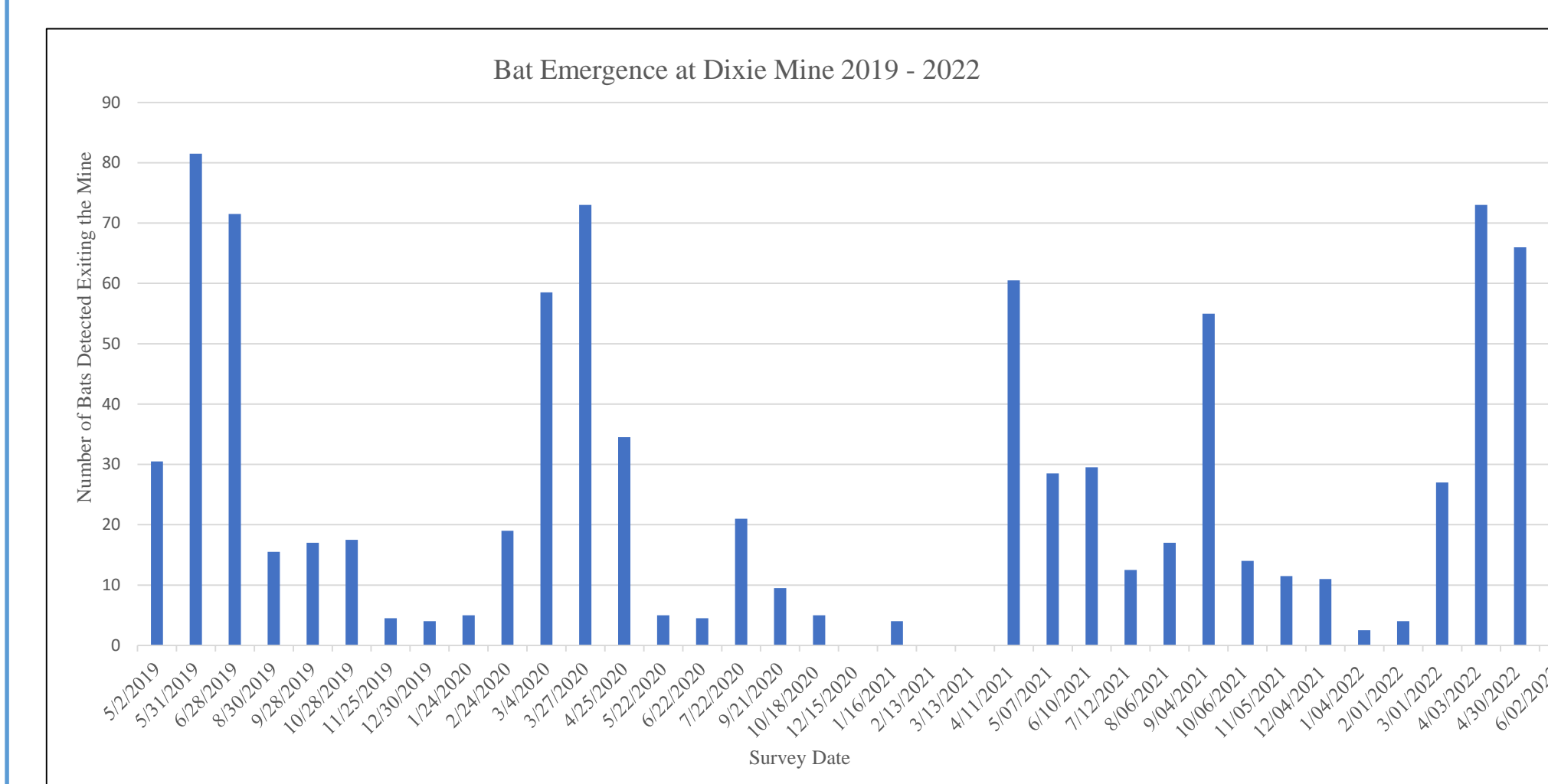


Figure 4. Bat detections at Dixie Mine from May 2019 to June 2022. The number of detections does not necessarily equal the number of bats, as an individual bat may exit and enter the mine multiple times.

Preliminary analysis suggests that the variables temperature and time of year best explain bat activity, where bats tend to be most active during the spring, as well as least active at very high and low temperatures.

Captures were conducted to confirm that the Townsend's big-eared bats were using Dixie Mine as a maternity roost. In May of 2022, we captured 41 female Townsend's big-eared bats, all of which were pregnant or lactating (Table 1).

Date	Species	#	Notes
9/3/2016	Townsend's big-eared bat	7	
	Cave myotis	3	
	Canyon bat	1	
7/9/2017	California myotis	1	
	Cave myotis	1	
8/9/2018		0	
5/17/2019	Townsend's big-eared bat	3	
	California myotis	1	
6/21/2019	Townsend's big-eared bat	16	Determined mine is a maternity roost
5/7/2022	Townsend's big-eared bat	41	All pregnant or lactating females

Table 1. Results of bat captures conducted at Dixie Mine, to date including 41 pregnant or lactating females on May 7, 2022..

CONCLUSIONS

Based on the three years of emergence counts, captures, and acoustic data, we have determined that Townsend's big-eared bat population continues to use Dixie Mine as a maternity roost.



Figure 5. Townsend's big-eared bat taken during a capture at Dixie Mine.

Proactive monitoring and managing a Townsend's big-eared bat population at a known maternity roost is essential to maintaining a healthy population into the future. Therefore, we are adopting an adaptive monitoring approach to bat monitoring at Dixie Mine (Figure 6).

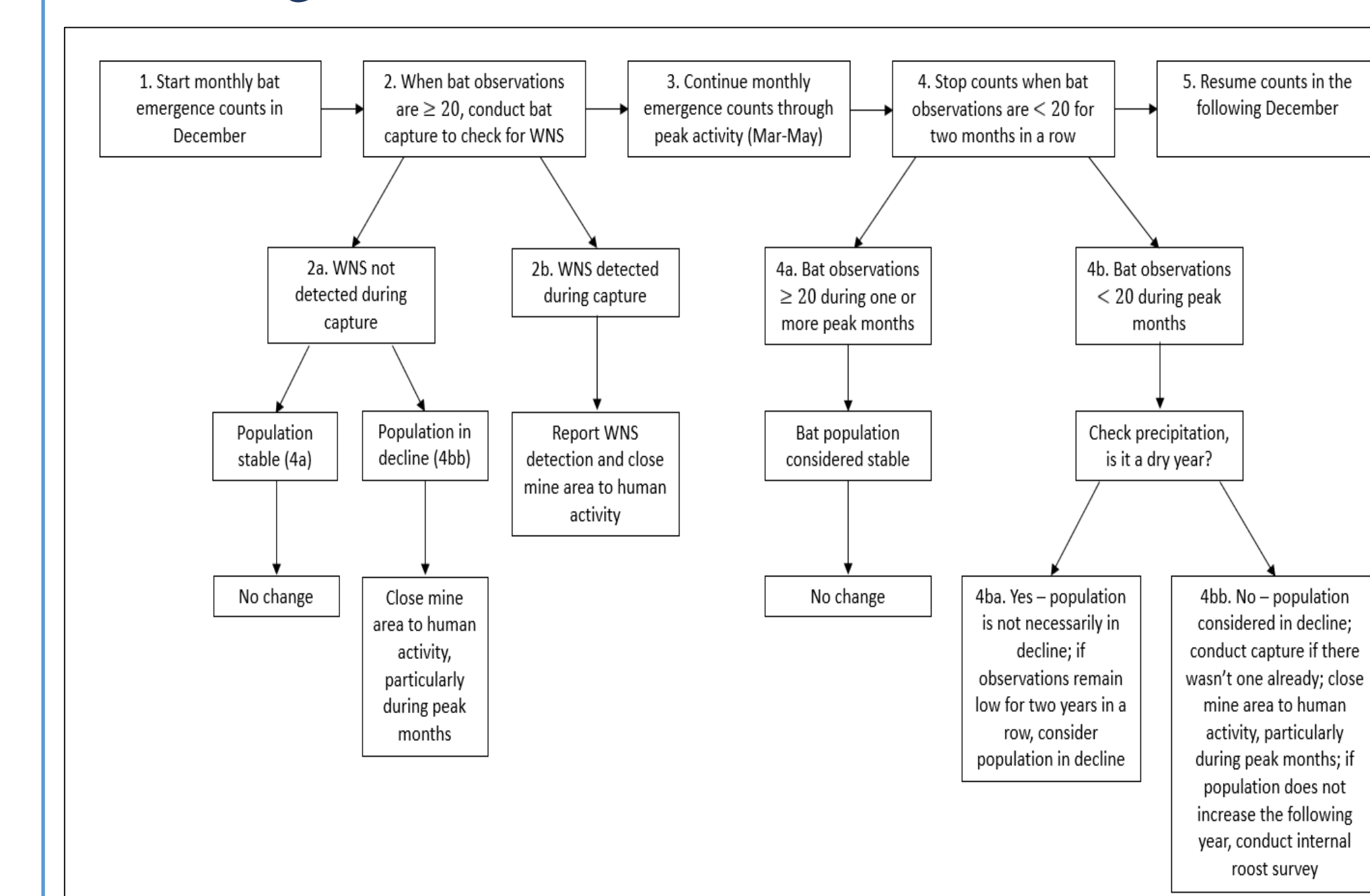


Figure 6: Adaptive management plan for monitoring the Townsend's big-eared bat population at Dixie Mine.

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