

Echolocation Survey Hassayampa River Preserve Bats 2020

Prepared April 2021 for Hassayampa River Preserve Maricopa County Regional Park

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Introduction

366 nights of bat echolocation recordings were made in 2020 at the Hassayampa River Preserve. No previous echolocation surveys have been carried out of the bat populations on the preserve. Mist netting and radio-location tracking have been minimally carried out in the past on the preserve but thorough surveys have not been completed. Being bats are nocturnal and elusive, relatively little is known about them in general and there has been a minimal amount of information known about bats of the preserve. Specifically, it is not known how common bats are on the preserve, what species are present and use the preserve, and what the seasonal use of the preserve is. It was the goal of this study to answer these unknowns about bats at the Hassayampa River Preserve.

Habitat

The preserve is located near Wickenburg, AZ in a perennial riparian habitat in the Upper Sonoran Desert. This habitat is one of the larger intact riparian areas in the Sonoran Desert with major plant communities being composed of *Populus fremontii*, *Salix gooddingii*, and *Prosopis velutina*. The surrounding Sonoran Desert Uplands are rocky and semi-mountainous with *Carnegie gigantea*, *Ambrosia deltoidea*, *Encelia farinosa*, and *Parkinsonia microphylla* plant associations. Development in the area has to this point been minimal. It is hypothesized that this relatively large and intact habitat is ideal for bats.

Data collection

The ultrasonic recorder was placed in the southeastern portion of the preserve in a *Populus fremontii* and *Prosopis velutina* open woodland. Open water was located approximately 50 meters to the south and 100 meters to the northwest. The Anabat Express zero cross recorder used was set to record nightly from sunset to sunrise. The area selected for recording was free of clutter that may disrupt echolocation recordings for 30 or more meters. The recording site was a transitory area for bats between major roosting areas, water sources, and feeding areas. By avoiding roosting, feeding, and water areas, an unmanageable number of calls were avoided and there was an increased chance that a single bat detection represented a single bat, rather than a single bat's continued use of the area repeatedly triggering recordings. All data was analyzed with Wildlife Acoustics Kaleidoscope Pro software to identify each call to the species level. All species were then verified manually but not all individual calls were verified to species manually. Three species, *Myotis*

evotis, *Myotis occultus*, and *Myotis thysanodes* were identified by Kaleidoscope Pro but could not be verified manually.

Bat species of the Hassayampa River Preserve

A total of 17 species of bats were detected in 2020 (refer to table 1 below). Species richness increased from February until peaking at the end of August. Species richness then decreased during the month of September until only a few species were detected nightly starting in the middle of October, returning to levels seen prior to February. The most common species detected were MYOVEL, TADBRA, EPTFUS, LASNOC, LASCIN, and MYOVOL. These species utilized the preserve between 146 and 237 nights in 2020 (at the site of the detector).

Table 1. Verified Bat Species Hassayampa River Preserve, AZ 2020

Species	Abbreviation	Total Detections	Total Days Detected
All Species and No ID		51995	341
Cave Myotis	MYOVEL	9644	209
Mexican Free-Tailed	TADBRA	6773	237
Big Brown	EPTFUS	5918	200
Silver Haired	LASNOC	3124	246
Western Small-Footed	MYOCIL	2507	188
Hoary	LASCIN	1267	189
Long-Legged Myotis	MYOVOL	1146	146
Desert Pallid	ANTPAL	628	121
Canyon Bat	PARHES	588	139
Western Yellow	LASXAN	317	98
Western Red	LASBLO	268	93
Pocketed Free Tailed	NYCFEM	232	82
California Myotis	MYOCAL	161	80
Yuma Myotis	MYOYUM	58	43
Underwood's Mastiff	EUMUND	30	14
Townsend's Big Eared	CORTOW	25	18
Big Free Tailed	NYCMAC	16	14

Several less common species of interest were also detected in 2020. CORTOW is a federally listed Vulnerable species and was detected 25 times and 18 days in 2020. LASXAN has been a US Forest Service listed Sensitive species and was detected 317 times and 98 days. LASBLO also has been a US Forest Service listed Sensitive species and was detected 268 times and 93 days. Further examination of these species by surveying different habitats is warranted by these detections.

Seasonal activity levels

Overall activity levels increased slightly from winter levels starting in late March, leveling off through the beginning of July (refer to figures 1 and 2 below). July had an extremely high level of activity that decreased into August, with low levels of activity taking place after the middle of September. The majority of activity taking place in July and August can be attributed to TABRA and secondarily to EPTFUS and MYOVEL and is possibly due to young fledgling bats that were born in prior months. Throughout the year, MYOVEL was found to be the most active species with approximately 30% more detections than TADBRA, the second most detected species. Bats were detected on the preserve 341 nights in 2020. All nights where bats were not detected were during January and February as well as November and December. PARHES was the only bat species with a short lived spike in activity during the winter.

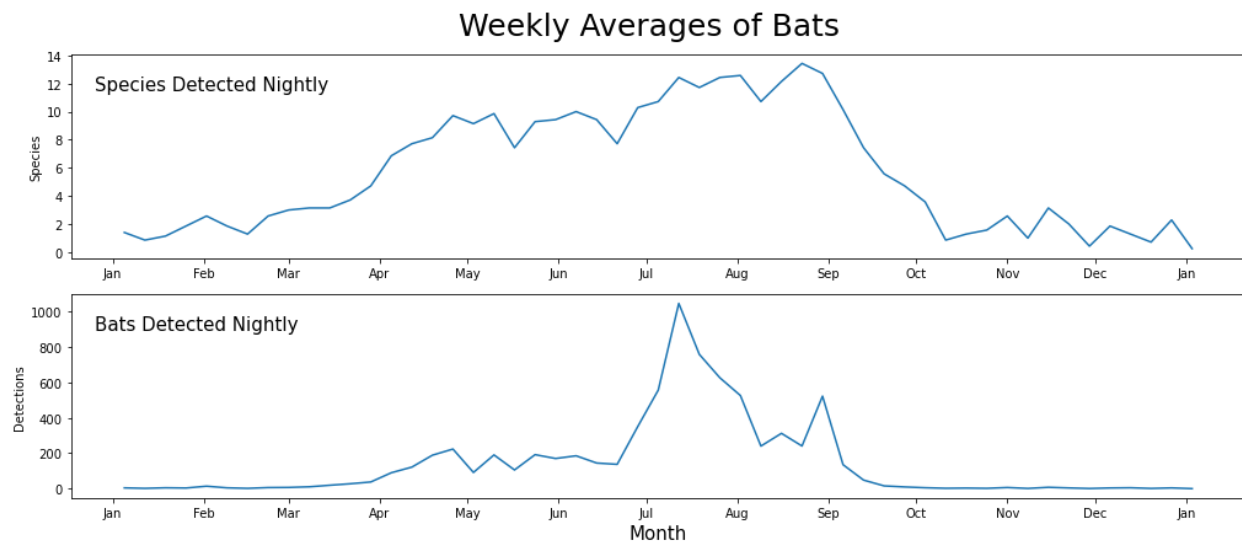


Figure 1. Weekly averages of species detected nightly top figure above. Weekly averages of total bats detected nightly in bottom figure above.

Migration or increase in bat activity was found to be a relatively gradual increase in spring and a more abrupt drop-off of activity in the fall. In spring, both activity and species increased gradually between late April and into June. Species richness and activity decreased rapidly in September. Migrations were difficult to identify due to high variability of the data. However, it is possible that a migration in September of TADBRA was identified. This September peak in TADBRA activity coincides with the known migration for this species. Additionally, an April migration for MYOVEL was also possibly identified.

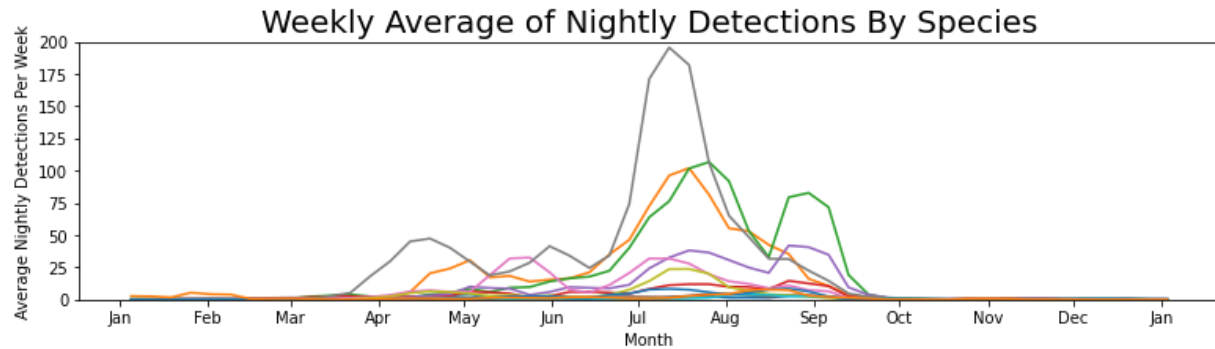


Figure 2. Weekly averages in bat detections broken down by species. This data is smoothed and individual species plotted together in order to identify patterns. Figures 3 and 4 below contain plots of the same data unsmoothed by individual species. The three species peaking in July are TADBRA (gray line), MYOVEL (green line), and EPTFUS (orange line).

Significance of findings to the preserve

The Hassayampa river preserve has a very high level of bat species and activity. The 17 confirmed species utilizing the preserve make this one of the most diverse bat communities in the United States. This diversity is likely owed to the combination of intact desert habitat as well as riparian habitat with perennial water. A number of very important species utilize the preserve throughout the year. Based on these findings, more work can be carried out to monitor bats in the future to identify changes in species use of the preserve. Additionally, searches for roosts could be carried out so they can be protected. Additional habitats in the area should also be surveyed in order to identify bat use and potentially identify different species or how species utilize the different habitats.

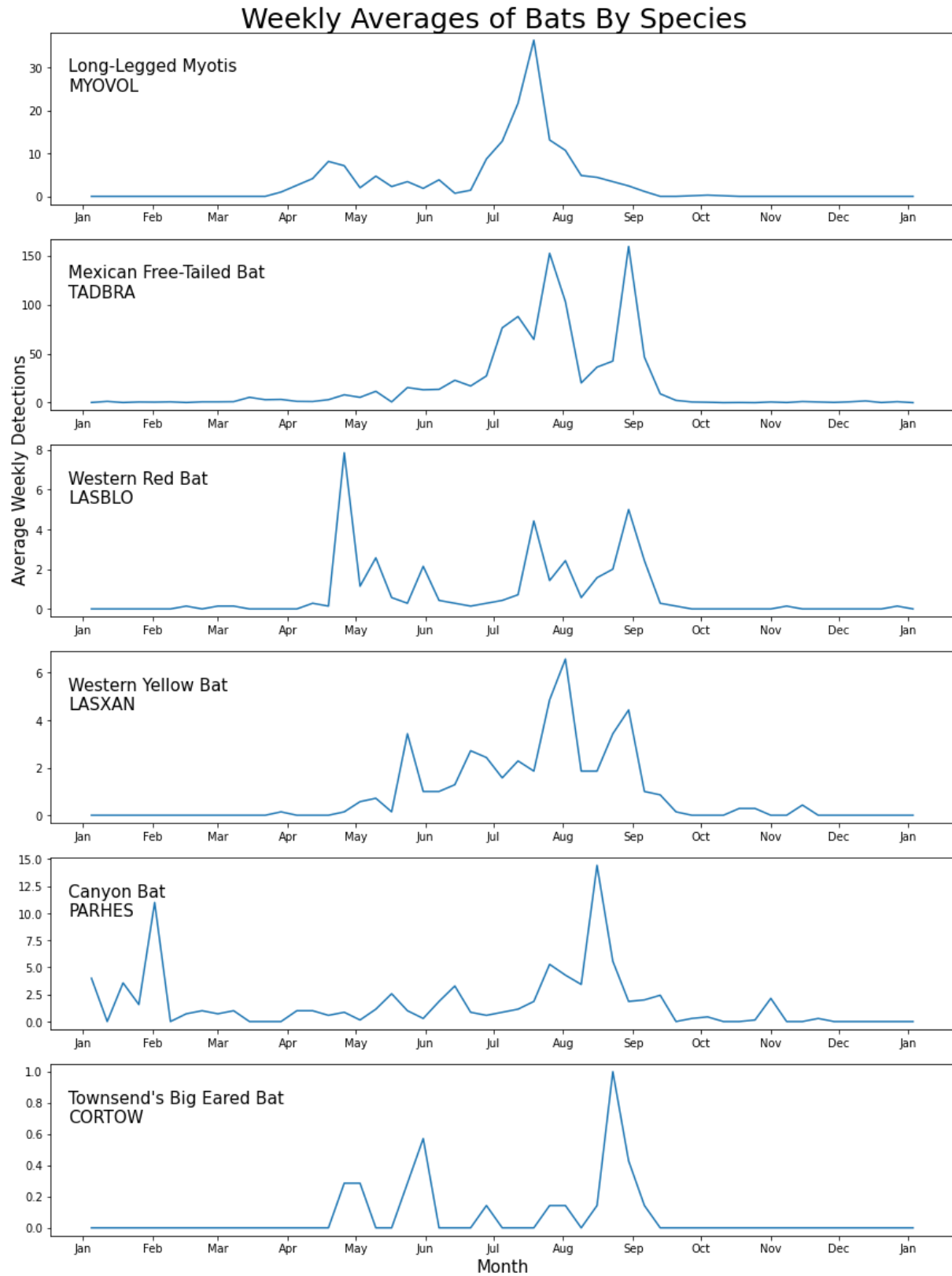


Figure 3. Weekly averages of nightly detections of the most common species and species of interest at the Hassayampa River Preserve.

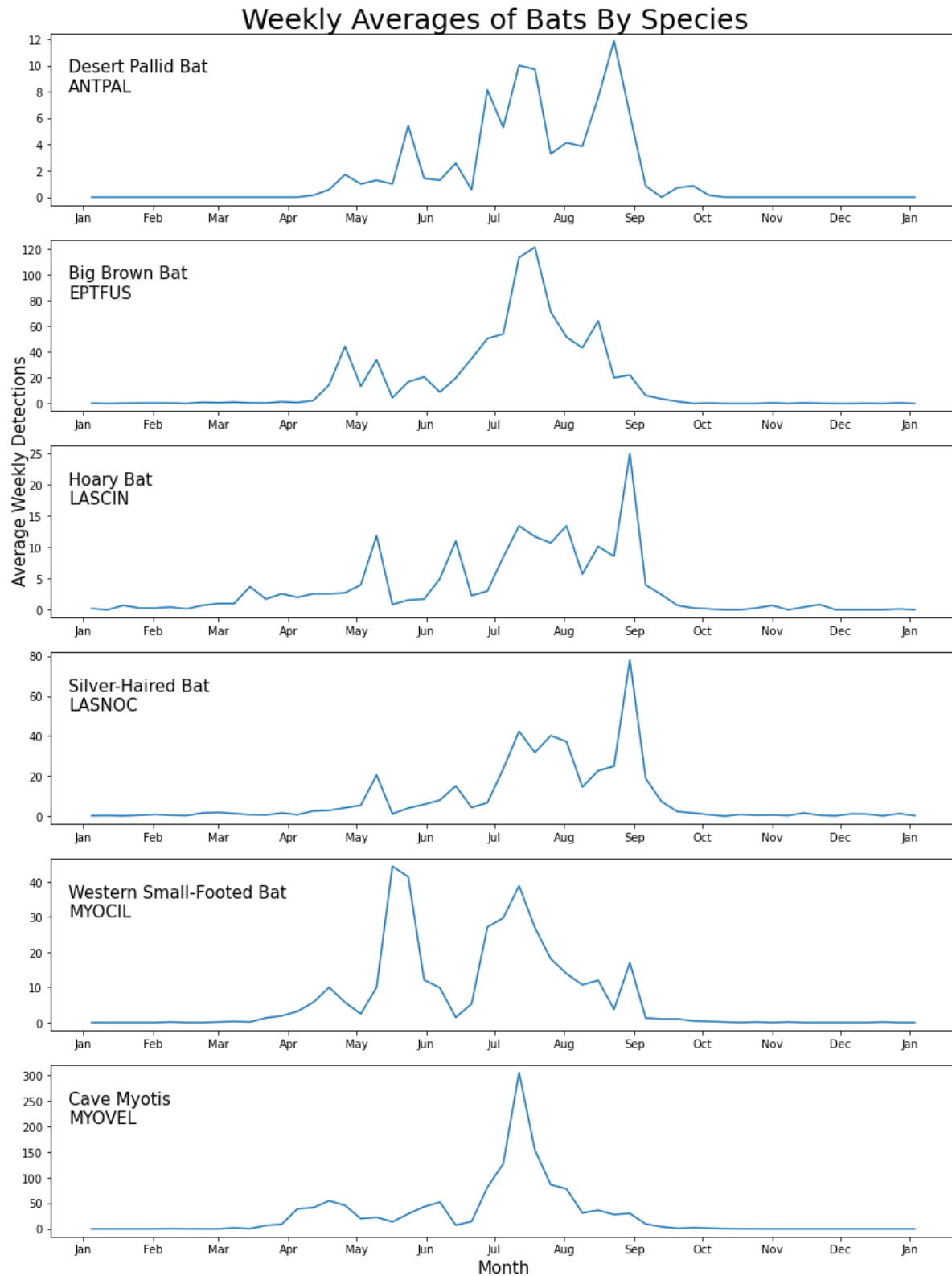


Figure 4. Weekly averages of nightly detections of the most common species and species of interest at the Hassayampa River Preserve.

To view GitHub repository for raw data, presentation, and Python code:
<https://github.com/haberkornm/Hassayampa-River-Bats>