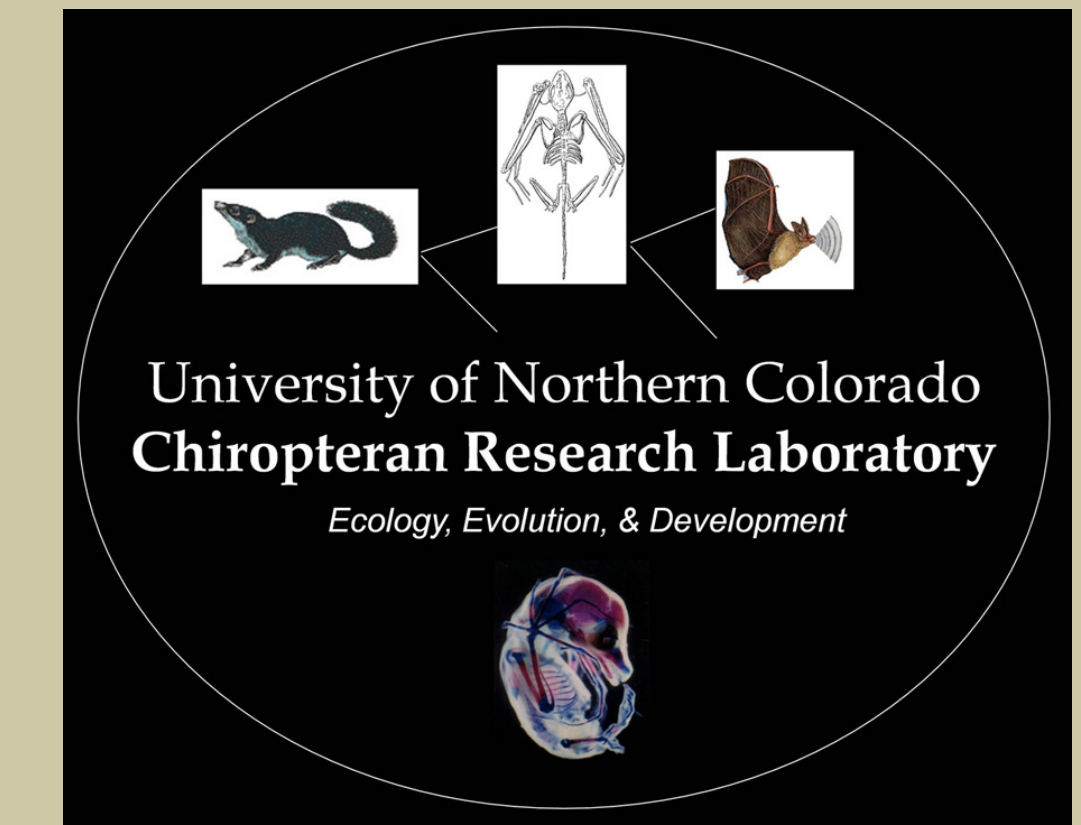


# Altitudinal Migration Patterns and Hibernation Activity in Colorado Bats



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## Introduction

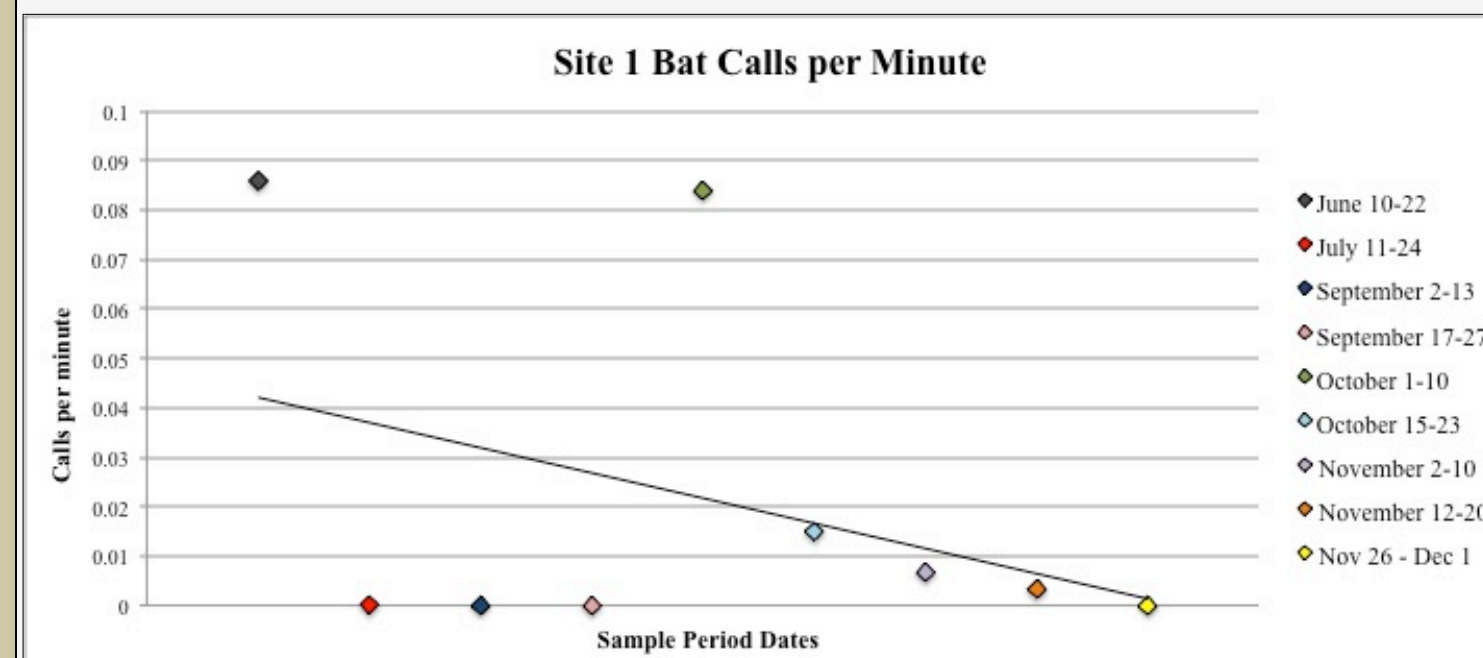
- In the fall bats migrate from lower elevations to higher elevations where they hibernate in rock crevices over the winter.
- On days with temperatures above freezing ( $0^{\circ}\text{C}$ ), bats will emerge to drink water from streams or ponds.
- Recent climate change studies are showing that many bats are staying at higher elevations over the summer instead of migrating back down to lower elevations.

## Materials & Methods

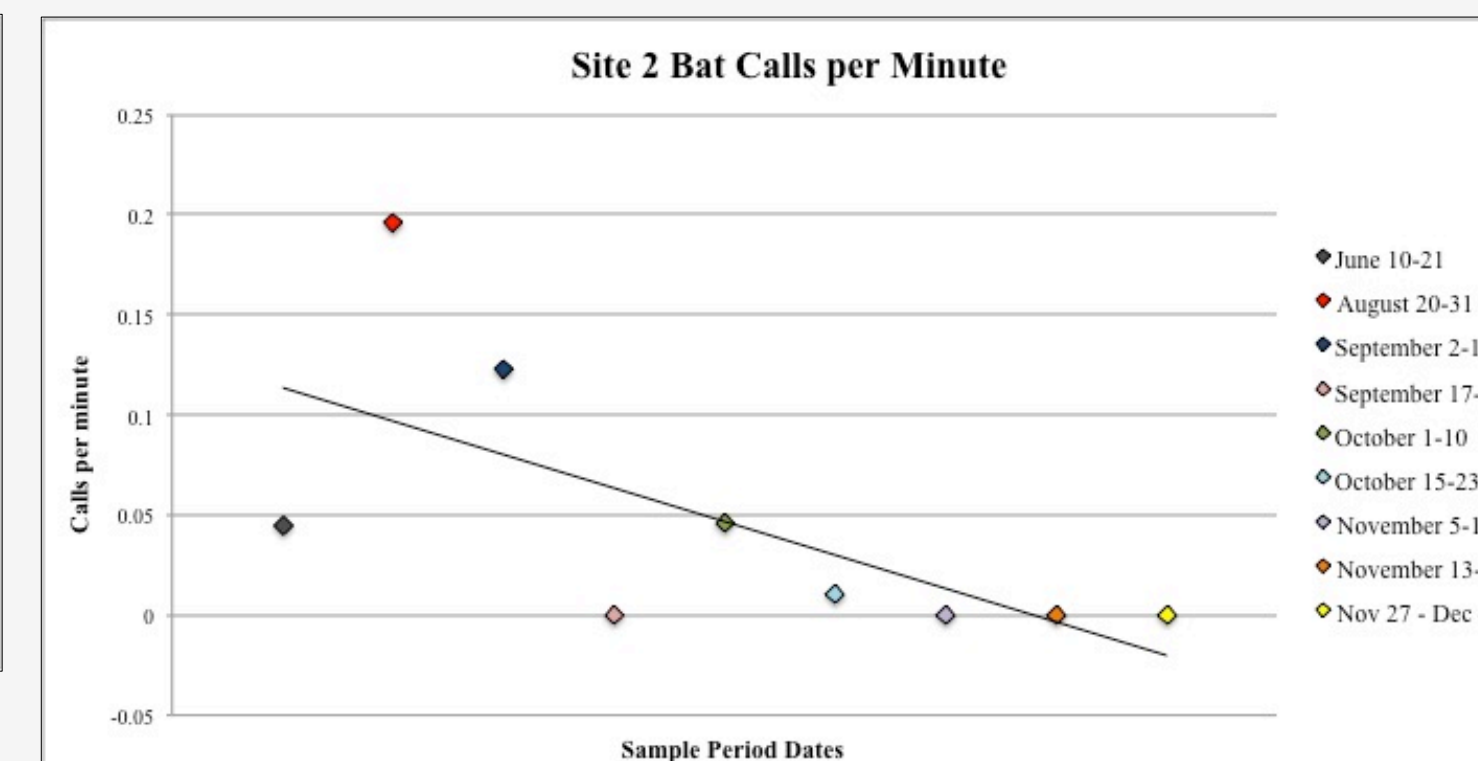
- Three bat sonar detectors were set up at increasing elevations in the St. Vrain Canyon near Lyons, CO.
- Site 1 is located at 5,430 ft elevation, Site 2 is 7,330 ft, and Site 3 is located at 7,990 ft.
- Every other week the batteries in the detectors were replaced and the data was retrieved for analysis in the lab on campus.
- After software analysis the data was compiled and the number of bat calls per minute during each sample period was calculated.



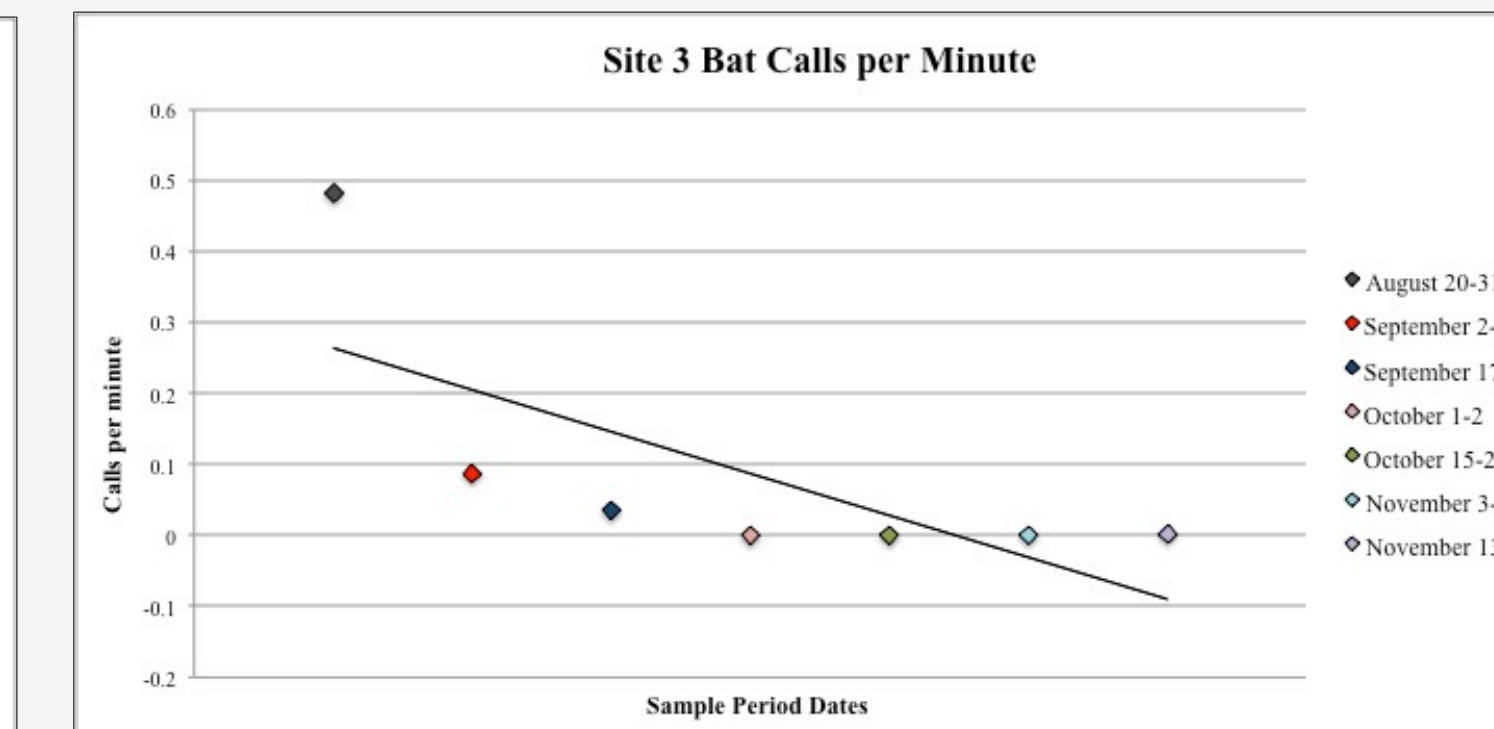
## Results



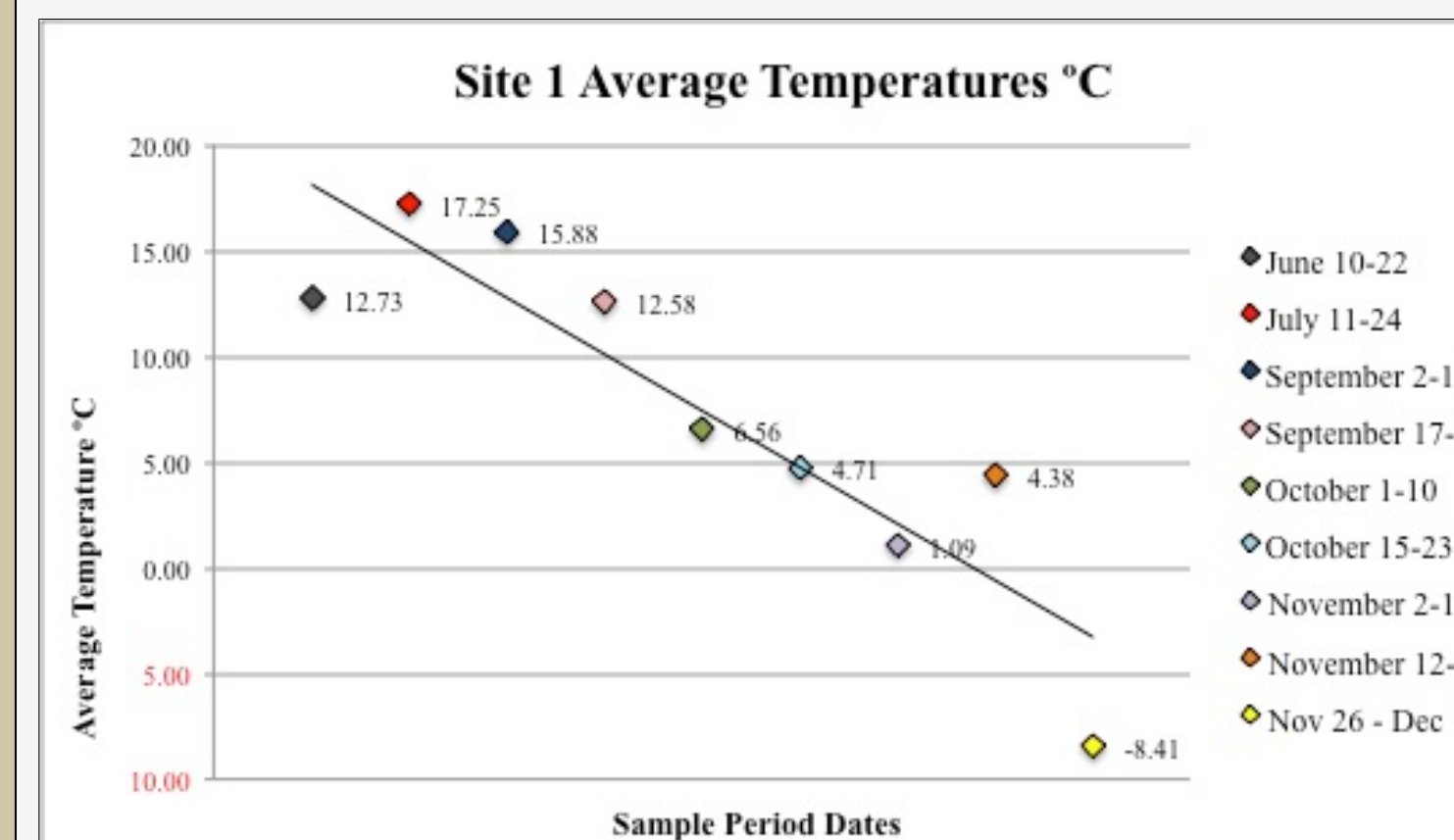
**Figure 1:** Calls per minute at Site 1 for each two-week time period.



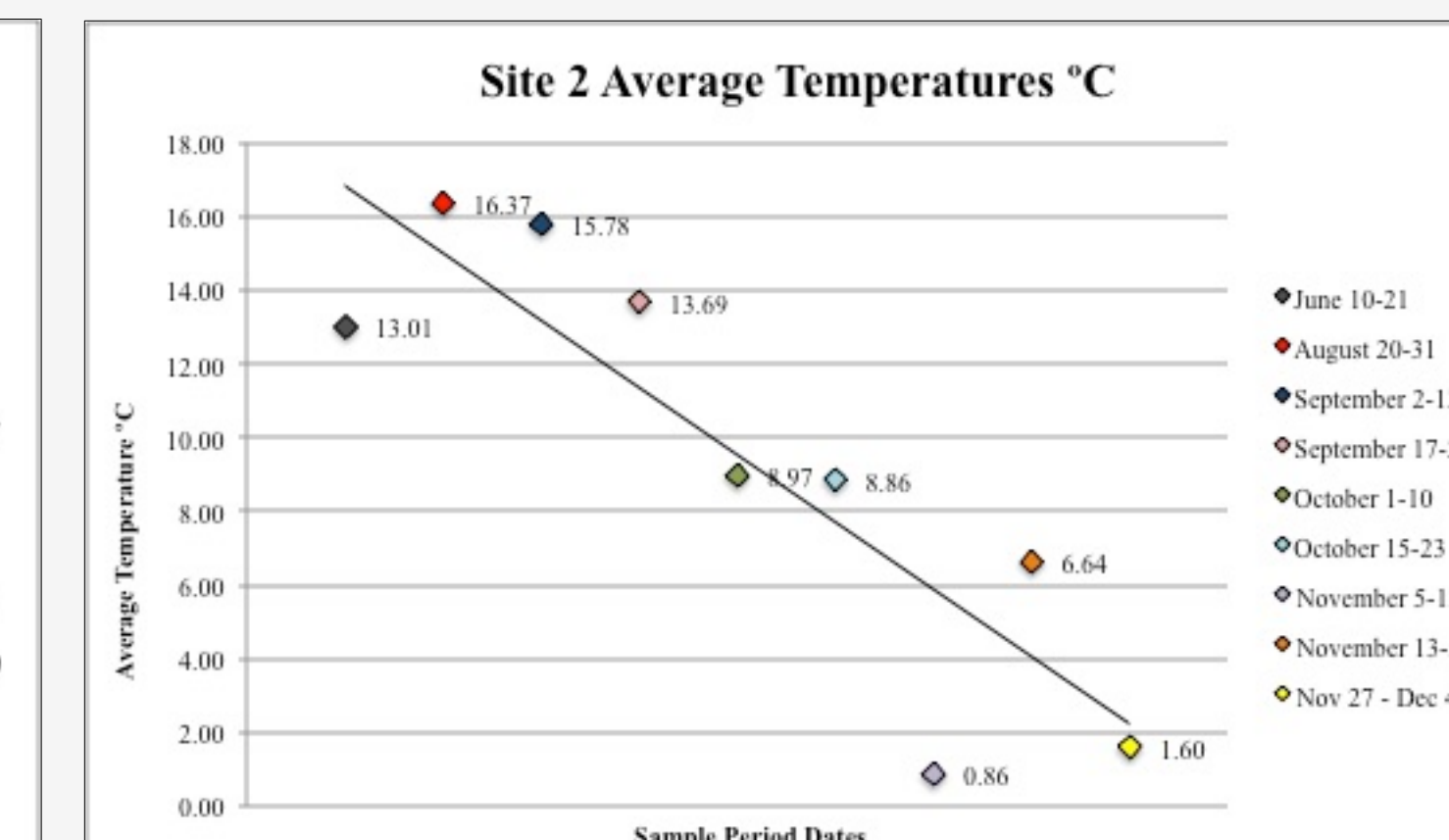
**Figure 2:** Calls per minute at Site 2 for each two-week time period.



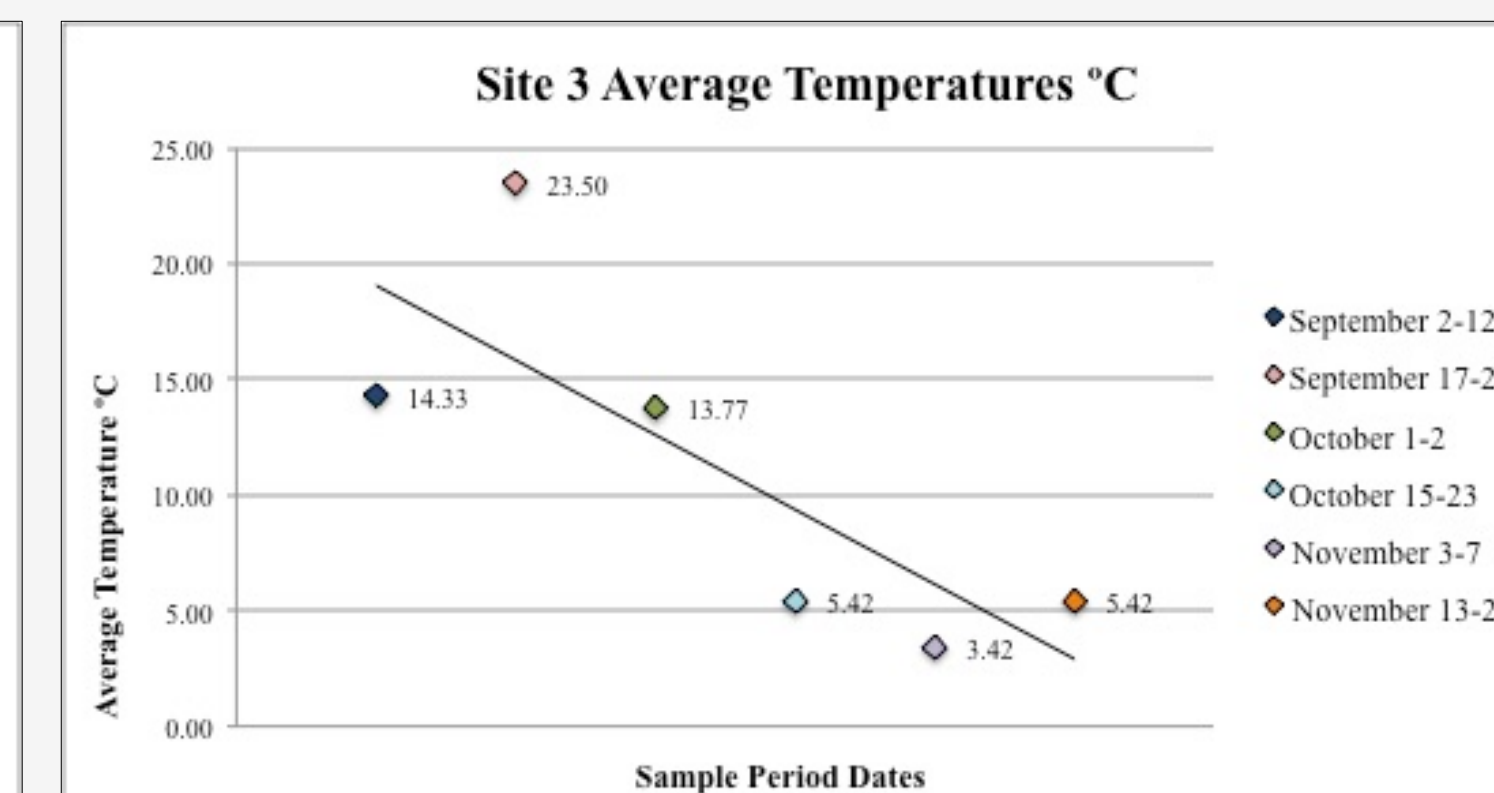
**Figure 3:** Calls per minute at Site 3 for each two-week time period.



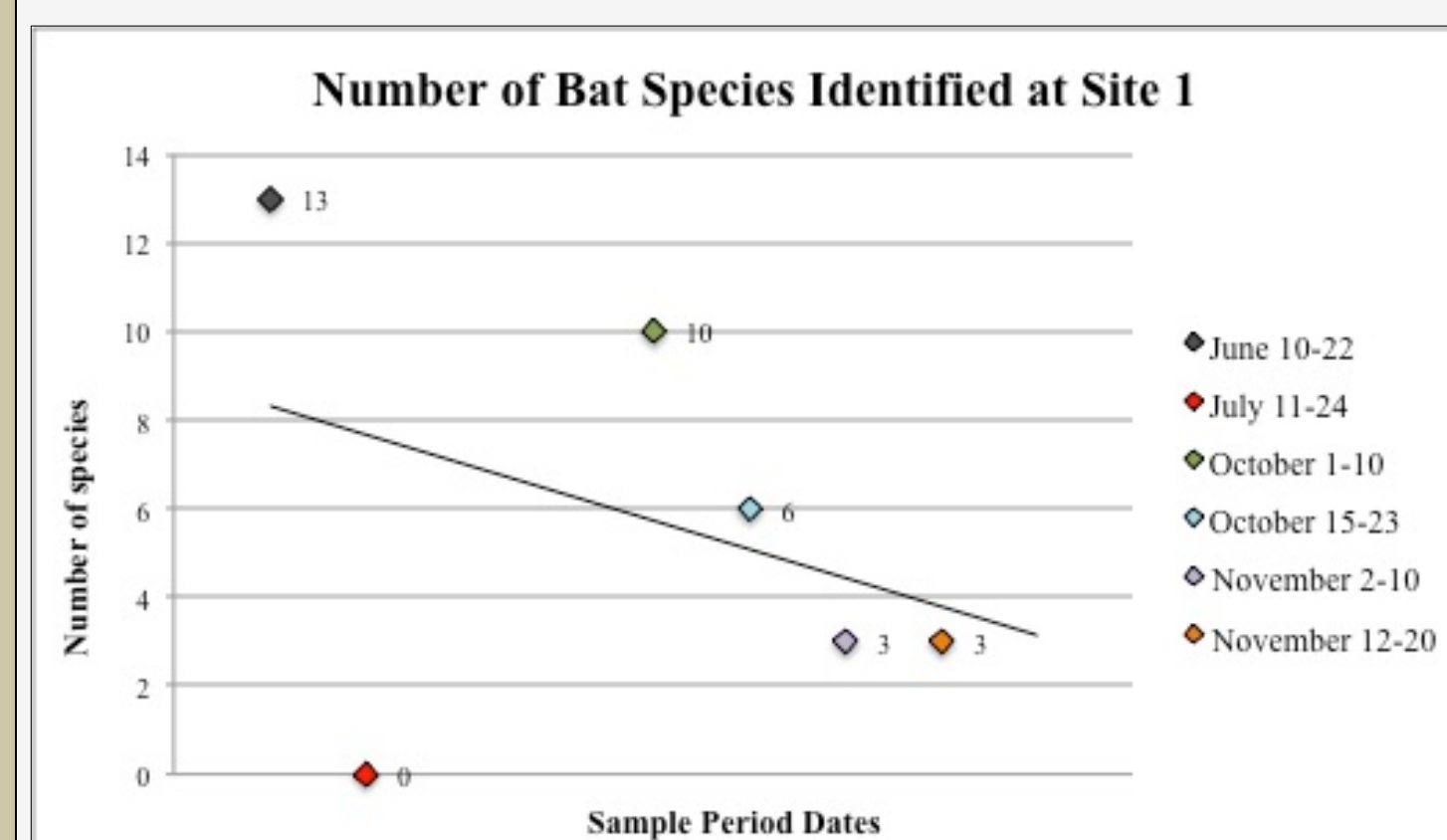
**Figure 4:** Average temperatures in  $^{\circ}\text{C}$  at Site 1 for each two-week time period.



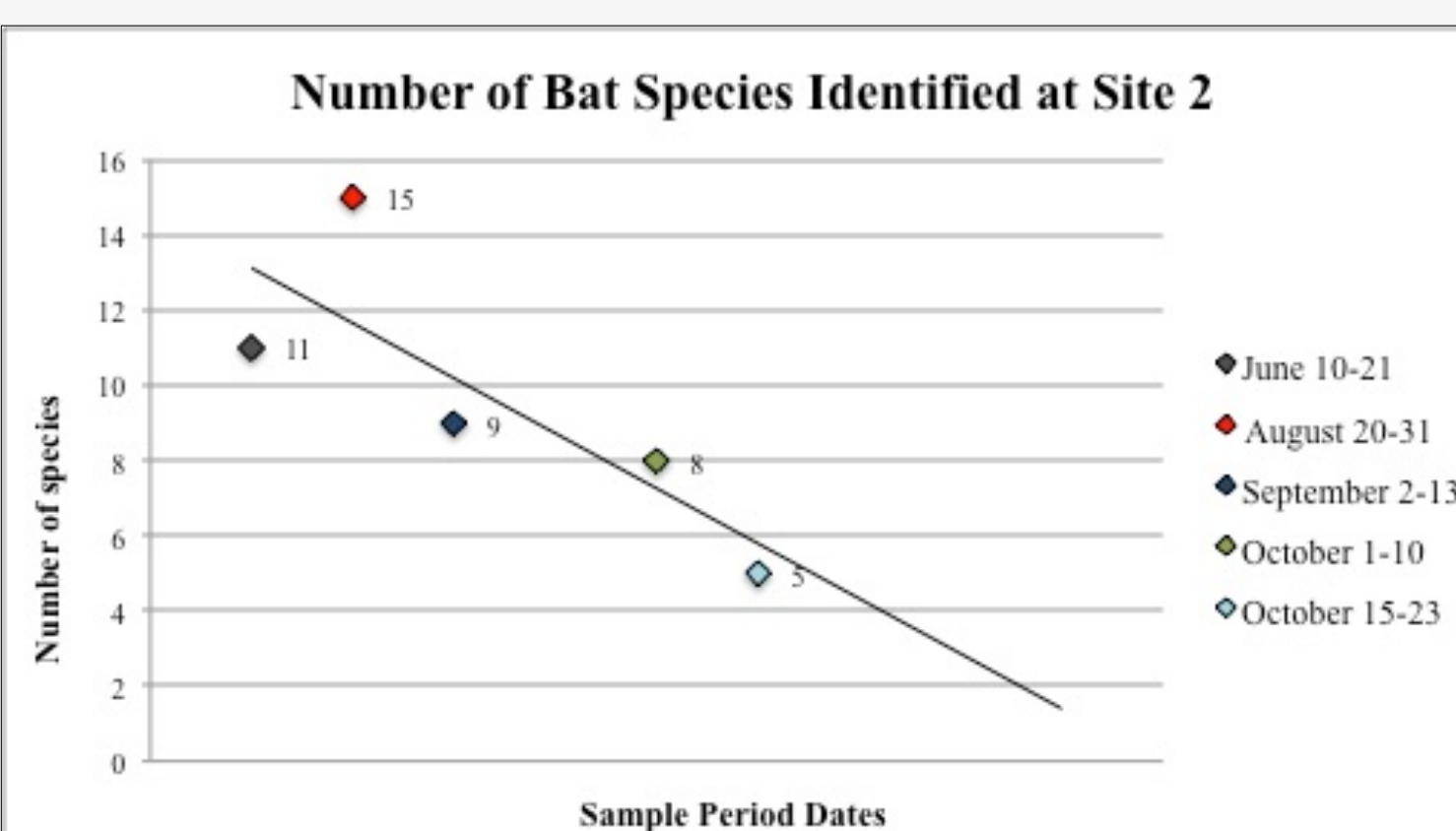
**Figure 5:** Average temperatures in  $^{\circ}\text{C}$  at Site 2 for each two-week time period.



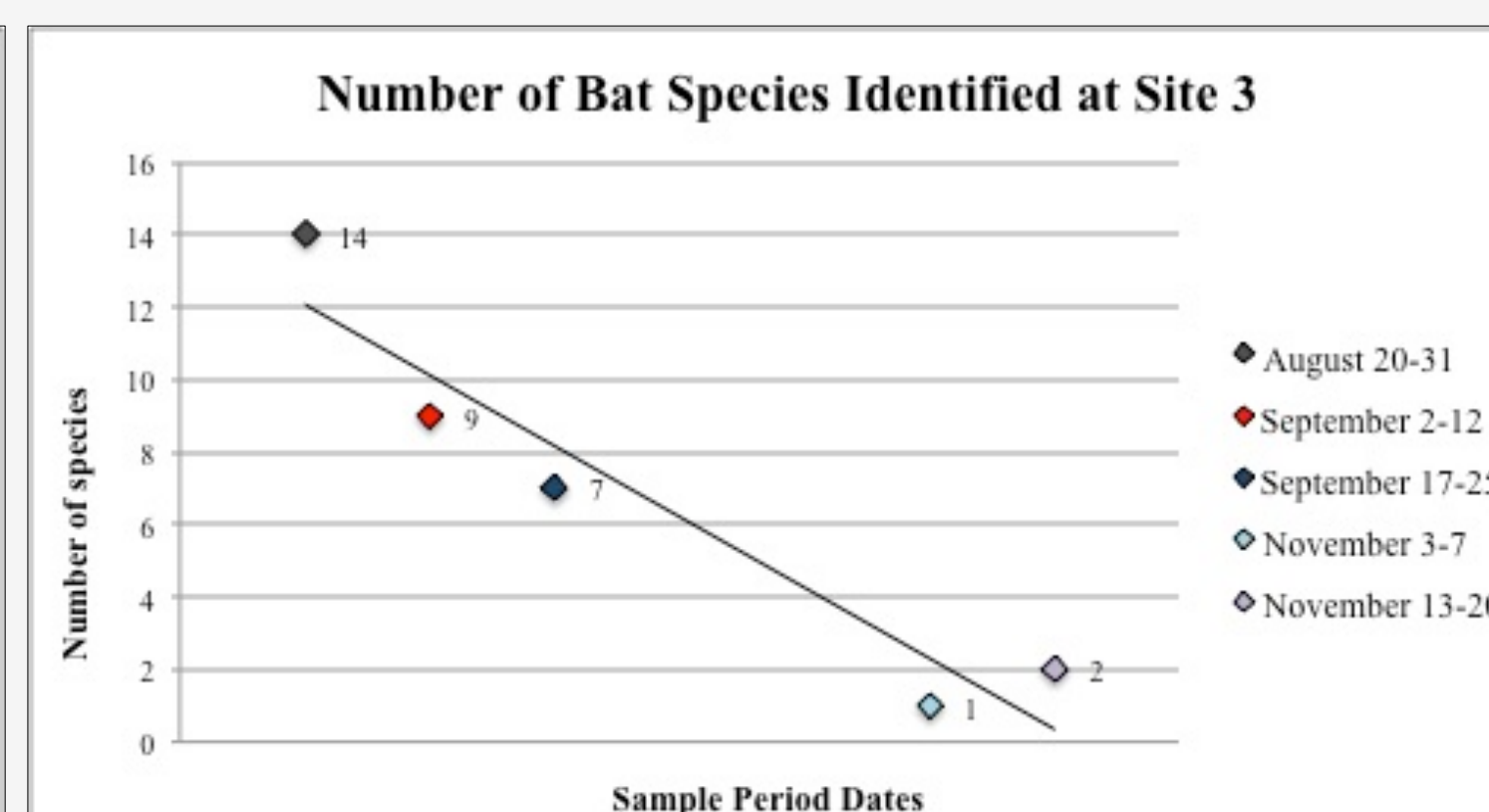
**Figure 6:** Average temperatures in  $^{\circ}\text{C}$  at Site 3 for each two-week time period.



**Figure 7:** Number of bat species identified at Site 1 during each two-week time period.



**Figure 8:** Number of bat species identified at Site 2 during each two-week time period.

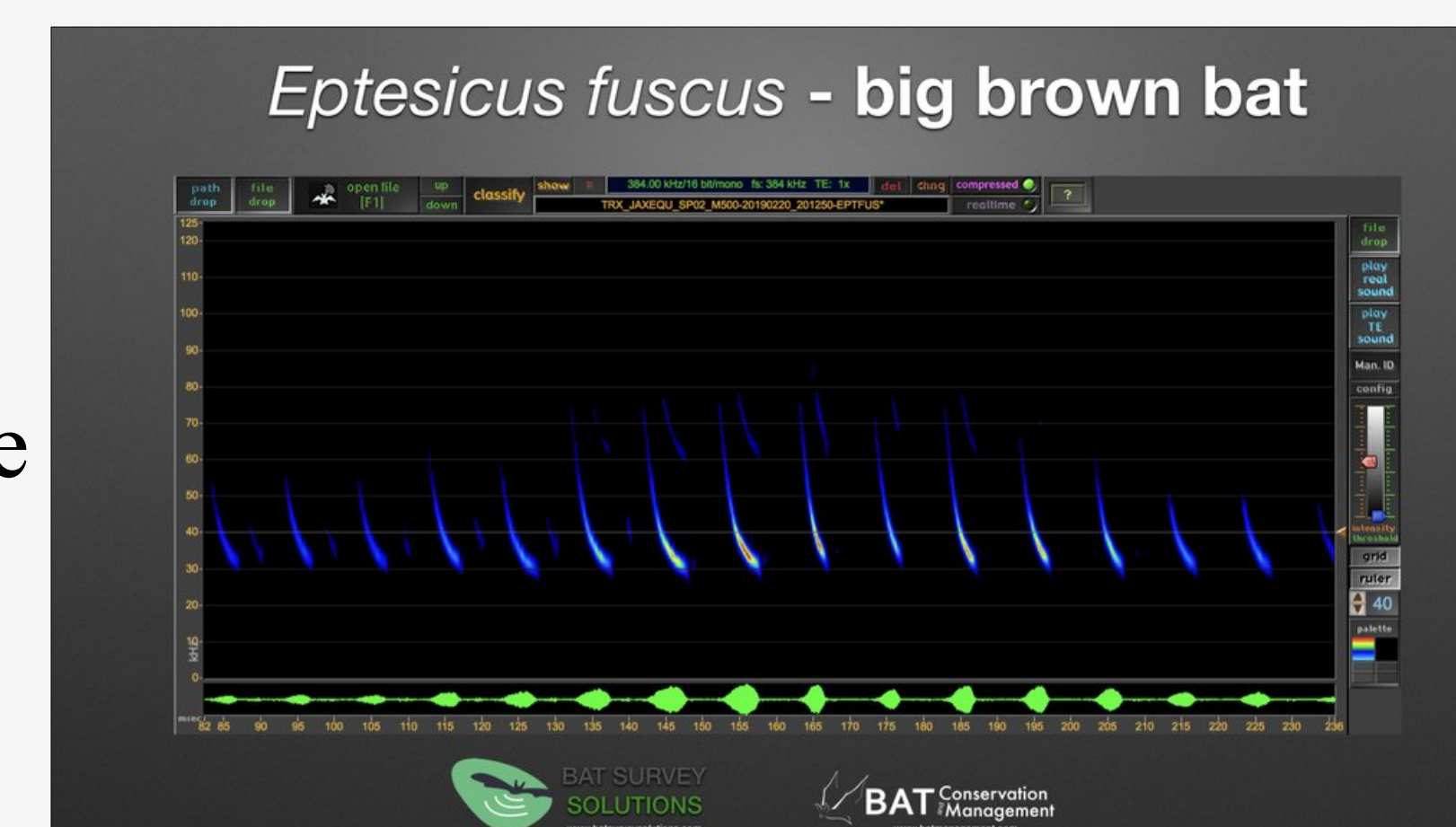


**Figure 9:** Number of bat species identified at Site 3 during each two-week time period.



**Photo 1:** Wading through deep snow during a snowstorm to change detector batteries in November

**Photo 2:** Example of SonoBat software analyzing Epfu (Big Brown Bat) bat call found on 'Bat Conservation & Management' website



## Conclusions

- Bats migrated from Site 1 up the canyon towards Site 3 as the weather got colder: there were more calls per minute later in the fall at the higher elevations than the lower sites.
- The total number of bat species observed at each site decreased as more bats started hibernating.
- Bats are a key indicator species of environmental conditions and often provide the first signs of unbalance within the ecosystem, so studying winter behavior and migration patterns provides a framework for comparison in the future to determine if climate change is causing bats to remain at higher elevations over summer.

## References

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