

Colorado Bat Watch

Project Manager

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Final Grant Report

Objectives

In 2023, Rocky Mountain Wild (RMW) launched Colorado Bat Watch (CBW), a collaborative initiative focused on filling a critical gap in bat research and conservation in Colorado (coloradobatwatch.org). CBW is a partnership between RMW, the U.S. Forest Service (USFS), Colorado Parks and Wildlife (CPW), the Colorado Natural Heritage Program (CNHP), and the North American Bat Monitoring Program (NABat). We aim to identify bat roost sites, monitor bat colonies, inform bat conservation efforts, and inspire people to conserve bats. Through CBW, we seek to advance the following statewide research objectives: 1) identify biologically important bat colonies through crowdsourcing information on bat roost locations and characteristics from the public, and 2) monitor bat colonies at key roost sites through summer emergence counts conducted by community scientists.

Colorado bats face severe threats from white-nose syndrome (WNS), habitat loss, wind energy development, pesticides, and climate change. WNS is a disease that affects hibernating bats, caused by the fungus *Pseudogymnoascus destructans* (Pd). WNS has killed millions of bats in North America since 2006. Pd was first confirmed in Colorado in 2022, and Pd and WNS have since been confirmed in several counties across Colorado. Colorado is home to 20 bat species, with at least 13 species at risk from WNS, and 18 classified as special status species (endangered, threatened, sensitive, special concern or other designation indicating that the species is vulnerable).

Methodology

Identifying Bat Roost Sites

We elicit information on bat roost site locations and characteristics from the public, with emphasis on roost sites in anthropogenic structures, talus, and trees. Members of the public learn how to spot roosting bats and report observations at coloradobatwatch.org. We collect data on roost site location, type of roost site, number of bats, land ownership, habitat, season of use, etc. We have received data on over 100 roost sites, including many roost sites that support large bat colonies. We implemented a strategic communications plan to encourage the public to report roost sites, and to recruit volunteers to participate in emergence counts. We received 39 additional reports of bats and bat roost sites from the public and recruited 34 volunteers who participated in emergence counts in 2025. We limited the number of volunteers and staff to the minimum required to conduct a reliable emergence count, to minimize disturbance to bats. In addition, 907 volunteers have signed up to receive information about future volunteer opportunities.

Summer Emergence Counts

There is an urgent need to expand bat population monitoring in Colorado. A key gap is monitoring colonies at important roost sites, especially maternity roosts, to determine and track the status of local populations. Community science allows researchers to collect more data over a larger area in less time than traditional methods.

CBW has developed a [summer bat colony emergence count protocol](#) and [data entry form](#) in collaboration with the NABat Summer Roost Count Working Group (SRCWG) and agency partners (USFS, CPW, CNHP). Our protocol meets multi-agency bat research needs in Colorado and aligns with the NABat framework. We conducted emergence counts using this protocol in 2025. We improved the protocol and data entry form based on input from agency partners and volunteers who participated in emergence counts in 2025. We also integrated updates from the NABat Summer Roost Count Working Group. The improvements make the protocol and data-entry form clearer and easier to use in the field, and they ensure that agency partners receive the data they need to effectively monitor and conserve bat roost sites. We are currently working to incorporate these improvements into the online form and database that will be used for long-term monitoring.

We used existing and new CBW and CPW data to identify biologically significant roosts (based on size of colony, type of use, species present, etc.), and determine suitability for monitoring (based on site accessibility, safety, and exit points for bats). We identified 29 potentially biologically significant roost sites across Colorado. We prioritized 14 sites on public land.

We identified and interviewed agency staff familiar with each roost site. We collected any available information on the current status of the bat colony, species present, season of use, and suitability for monitoring. Through this process we identified 11 sites on public land that appeared to be biologically significant and suitable for monitoring. We scouted seven of these sites prior to conducting emergence counts to determine site accessibility, safety, and exit points for bats. We determined that it was possible to conduct emergence counts with community scientists at six of the seven sites. Emergence counts must be conducted by staff at one site that is closed to the public. We collected site information needed to facilitate future emergence counts at each site (number and location of potential bat exit points, access and parking instructions, agency contacts, safety considerations, etc.).

We conducted 14 summer emergence counts across the seven sites (see photo in Appendix 1). Community scientists and agency staff joined our team to complete the surveys, following the protocol and data-entry procedures described above. All participants received training prior to conducting counts.

At each roost site, we identified all potential exit points and positioned at least one observer at each whenever possible to ensure complete counts. Observers recorded the number of bats emerging from 30 minutes before sunset until 15 minutes after the last bat emerged, or until it was too dark to see. Bat echolocation calls were recorded using Echometer Touch 2 Pro units to document species presence.

The optimal period for long-term monitoring is when adult colonies are largest and most stable, and before pups become volant (typically late May to June in Colorado). We aimed to complete at least one count during this window. When resources allowed, we conducted additional counts later in summer and early fall to characterize seasonal roost use.

Some counts were completed with fewer observers than ideal, or outside the optimal monitoring window. Nonetheless, these surveys provided valuable information to support

management and conservation of roost sites, including confirmation of occupancy, documentation of species present, qualitative estimates of colony size, and insights into seasonal patterns of use across life-history stages. All data is stored in CBW's database. A subset of data (not including volunteer names and email addresses) will be transferred to NABat and shared with agency partners.

We were unable to visit four of the eleven priority sites in 2025. Coordination with federal agency partners was challenging due to staffing reductions and hiring freezes. In addition, we initially planned for trained volunteers to conduct counts independently. However, a number of the roost sites had many potential exit points, requiring that staff be present to coordinate large groups of observers. Additionally, one site was closed to the public, and most sites had complex access and agency coordination requirements.

As a result, at least two staff members were needed for every emergence count. Several counts also had to be canceled and rescheduled due to weather. Collectively, these factors meant that each emergence count required more staff time than originally anticipated.

Results and Significance to Conservation

This research is providing essential data needed to conserve bat populations across Colorado and ensure that bats continue to provide crucial ecosystem services by regulating insect populations.

We are successfully crowdsourcing information on bat roost site locations and characteristics and using that information to identify biologically important bat colonies and inform collaborative efforts to conserve these colonies. We used data from our database and agency partners to identify and prioritize 11 potentially biologically significant roost sites on public land for emergence counts.

We used emergence counts to determine that five of seven sites were occupied by significant numbers of bats, and by multiple bat species. All five sites were occupied during the maternity season, indicating that they are maternity roost sites, and some sites were also occupied during other seasons and life history stages. This data suggests that these roost sites are important to local bat populations. The following bat species were present at one or more of the five sites: Silver-haired bat (*Lasionycteris noctivagans*), little brown bat (*Myotis lucifugus* - see photo in Appendix 1), long-legged myotis (*Myotis volans*), big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cinereus*), Brazilian free-tailed bat (*Tadarida brasiliensis*), California myotis (*Myotis californicus*), and Western small-footed myotis (*Myotis ciliolabrum*). Additional species were detected on the Echometer Touch 2 Pro device, but still need to be confirmed through manual identification. Manual confirmation of species is needed as the initial auto-identification provided by the app associated with the device can be inaccurate. We are working to manually identify the remaining species. We now have valuable data to inform collaborative efforts to conserve these important bat colonies.

We did not observe bats at two of the seven sites. One site consisted of a large bat condo and several bat houses built to replace habitat lost when a maternity colony was excluded from an agency work building due to human health concerns. We found no evidence that bats are using the bat condo or bat houses. These results can help guide strategies to improve the structures and contribute to broader understanding of how effective bat condos and bat houses are as mitigation tools. Weather may have prevented the bats from emerging at the other site where bats were not observed. This site will be visited in 2026.

Emergence counts also established baseline data on five bat colonies that will be used for long-term population monitoring. This data will be critical to detecting local bat population declines, assessing threats to local bat populations, and informing efforts to protect bats from WNS and other threats. Data will be shared with the NABat monitoring program, which coordinates partners across North America who use standardized protocols to gather data to assess continental population status and trends, and inform responses to stressors.

Public land management plans in Colorado include conservation measures that apply to newly identified bat colonies (e.g. WNS surveillance, closures to prevent the spread of WNS, and buffers to protect colonies from disturbance). When a roost site is reported, we collect information on plans to exclude bats from the roost site, and on the presence of sick or dead bats. This allows us to provide targeted information on how to coexist with bats, humanely exclude bats, or mitigate the impacts of exclusion (e.g. build a bat condo nearby). If sick or dead bats are reported, CPW is automatically notified, allowing CPW to test bats for WNS. Data will also help researchers learn more about the distribution of bats and how bat species select habitat, in turn informing habitat conservation plans. Our agency partners in Colorado will use the data we collected in 2025 to inform implementation of their bat conservation plans and strategies.

We gained important insights from implementing emergence counts in 2025. We improved our protocol and data entry form, and identified additional project needs and areas for improvement. We are considering conducting a pilot study in 2026 to explore the potential for using a new method for conducting emergence counts. Recent studies suggest that it may be possible to deploy acoustic recorders near roost exits and simultaneously count emerging bats with human observers, and then correlate acoustic sound pressure levels with the exit rates of bats. After an initial calibration period with visual or thermal counts, acoustic recordings could then be used to monitor changes in colony size over time, potentially providing a continuous and less labor-intensive method for tracking colony dynamics.

Community scientists could conduct calibration counts and set up acoustic recorders. Continuous acoustic monitoring could potentially yield reliable data if bats emerge when it is too dark to see, capture daily and seasonal variability in numbers of bats present at roost sites, and overcome logistical difficulties with scheduling counts around weather and other factors. If effective, this method could greatly enhance CBW's capacity to monitor a larger number of roost sites statewide.

Communicating Findings

We are working on finalizing the online data entry form and database that will be used to share roost site and colony count data with our agency partners and NABat. We anticipate that this work will be completed and data will be shared by this winter (depending on when NABat approves proposed changes). We communicated findings to all Rocky Mountain Wild and Denver Zoo Conservation Alliance (DZCA) community scientists at our annual community science celebration that we hosted in partnership with the DZCA in November. We plan to share our results with the public through our website, media outreach, social media, and a variety of presentations, including a talk for the Lois Webster Fund/Denver Audubon audience in spring 2026.

Partners

CBW partners include the U.S. Forest Service, Colorado Parks and Wildlife, the Colorado Natural Heritage Program, Boulder County Parks and Open Space (BCPOS), and the

North American Bat Monitoring Program. These partners provide: 1) guidance on CBW objectives, 2) scientific advising, and 3) input on bat research needs. In turn, CBW partners will use our data to aid in bat research and conservation. In addition, the USFS and BCPOS provide funding and NABat provides centralized data storage.

Conclusion

We used funding from the Lois Webster Fund to support a Field Technician and Community Science Intern. This position was critical to our success in meeting all of the objectives described above in 2025. Given our experience this year, we feel that CBW has the potential to make significant contributions to bat conservation moving forward, if we can raise sustainable funding for the program. This work would not have been possible this year without the support of the Lois Webster Fund. Thank you for your support.

Project Manager:

A handwritten signature in cursive script that reads "Megan Muelle".

Date: 12/1/2025

Appendix 1: Photos

Little brown bats were present at several of the roost sites surveyed this year. We do not enter bat roost sites to avoid disturbing bats. This photo is from Colorado Parks and Wildlife. No photo credit necessary.



Field Technicians/Community Science Interns preparing for an emergence count at a bat condo.
No photo credit required.

