Guidelines for Mitigating Impacts of Development on New Mexico's Bat Communities

*Hoary Bat (*Aeorestes cinereus*). J. N. Stuart.*

Background

General Bat Information

Bats play a critical role in natural and managed ecosystems in North America and across the globe (Ramirez-Francel et al. 2022). Bats act as predators for insect species considered agricultural pests, pollinators for both wild and cultivated plants, seed dispersers, and much more, benefiting both the environment and humans (Ducummon 2000). These benefits to the environment, that also support human wellbeing, are often referred to as "ecosystem services". The ecosystem services bats provide are irreplaceable if lost (Daily et al. 2000, Kremen 2005, Kunz et al. 2011).

Over 150 species of bats live in North America, representing roughly 10% of the total number of bat species globally (Adams et al. 2024) . As of 2024, the United States had 44 documented bat species (Adams et al. 2024, Simmons and Cirranello 2026).

There are approximately 29 species of bats known to occur in New Mexico (Malaney et al. 2022, pers. comm. E.W. Valdez, U.S. Geological Survey), placing New Mexico among the states with the highest number of bat species present (Patten 2004). Of these 29 species, 16 are currently listed as Species of Greatest Conservation Need (SGCN) by the New Mexico Department of Wildlife (Department) in the 2025 State Wildlife Action Plan for New Mexico (SWAP; NMDOW 2025).

Threats to Bats

Of the bat species present in North America, over half are considered at-risk of extinction by at least one country within their geographic range. This number jumps significantly higher in the United States, with 75% being considered at risk (Adams et al. 2024).

Current estimates are that 90% of bat species found in North America have experienced population declines in at least one country within their geographic range. There is evidence that in the United States alone, almost half of the bat species present have experienced some level of population declines. Over half of North American bats have a moderate or very-high risk of extinction within the next 15 years (Adams et al. 2024).

Habitat loss is a major threat to bats in North America and across the globe (Frick et al. 2020, Francis et al. 2026). Climate change, especially drought, is another top threat to species in the United States, known to directly impact almost half of the country's bat species (Adams et al. 2024).

PROJECT GUIDELINES

ABOUT

The New Mexico Department of Wildlife Project Guidelines provide conservation measures to minimize impacts of land use and development projects on wildlife and wildlife habitats. This set of guidelines provides mitigation measures for the protection of bats. For more information on this topic, please call 505-479-1269.

ERT for NM

The Environmental Review Tool (ERT) for New Mexico is a web-based system that quickly screens land use and development projects for potential impacts to wildlife and wildlife habitats. The ERT provides best management practices and guidance to mitigate these impacts. Evaluate your project with the ERT at: https://nmert.org/home.

EEP DIVISION

The Ecological and Environmental Planning (EEP) Section's Technical Guidance Team coordinates the Department's environmental review process and works with community, private sector, state and federal government, nongovernmental organizations, and other project proponents to protect and enhance wildlife habitats. The Section implements the Share with Wildlife program and maintains BISON-M, a database of New Mexico's wildlife species. It also participates in the development and application of wildlife-related information management and planning tools.

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*Swabbing a cave myotis (*Myotis velifer*). K. Ingham*

Collecting soil and guano. G. Seamster.

*Lesser long-nosed bat (*Leptonycteris yerbabuenae*). T. Laverty.*

*Big free-tailed bat (*Nyctinomops macrotis*). Department.*

*Fringed myotis (*Myotis thysanodes*) roosting in barn. K. Geluso.*

Pesticide use also threatens bats. Bats may be exposed to pesticides by eating or otherwise coming into contact with insects, fruits, or flowers that have been treated (Williams-Guillen et al. 2016). Exposure to pesticides and other chemicals may lead to the death of individual bats (Kunz et al. 1977, Clark 2001), changed metabolic rates leading to weight loss (Swanepoel et al. 1999), and potential reproductive risks (Stahlschmidt and Brühl 2012). All of these outcomes can precipitate population declines, especially when combined with other types of threats (Kannan et al. 2010).

Other threats that bats face in the United States and specifically in New Mexico include invasive and problematic species (e.g., white-nose syndrome [WNS]), natural systems modification, energy production (e.g., wind farms and oil and gas development), human intrusions and disturbance (e.g., recreation), biological resource use (e.g., logging), transportation and service corridors, and pollution (Adams et al. 2024, NMDOW 2025). Bats that migrate either within or outside of the United States may face multiple different types and levels of threats over the course of their lives. Consideration of the full life cycle of migratory species is important in terms of the success of long-term conservation efforts (NMDOW 2025).

Benefits of Bats

Bats are effective at reducing the numbers of various insects, including those considered agricultural pests (Kunz et al. 2011). The pest-control services provided by bats across the United States are valued at approximately $23 billion per year, saving money for agricultural producers and both private and public land managers (Boyles et al. 2011). This, combined with their pollination services, makes bats one of the most economically important, yet overlooked, group of wild animals in North America (Boyles et al. 2011, Brown et al. 2015). Relevant to New Mexico in particular, bats are known to consume the pecan nut casebearer (*Acrobasis nuxvorella*) and the hickory shuck-worm (*Cydia caryana*) (Brown et al. 2015), some of the primary pests posing a threat to the production of pecans (*Carya illinoinensis*) (Reid 2002), which is an economically important crop in the state (Lillywhite et al. 2007).

Further examples of the ecosystem services provided by, and general value of bats, include the pest suppression services provided by the Brazilian free-tailed bat (*Tadarida brasiliensis*), which occurs throughout New Mexico (Cleveland et al. 2006, Kunz et al. 2011). More specifically, during lactation, a female Brazilian free-tailed bat may consume roughly 70% of its bodyweight in insects (Kunz et al. 1995), which contributes significantly to their ability to control pest species and help protect crops. This species also contributes to the local economy in southeastern New Mexico by drawing in visitors to view their flights at Carlsbad Caverns National Park. Research also shows that more than half of the insects eaten by the bats that roost at Carlsbad Caverns feed on crops (Des Marais et al. 1980), which suggests these bats also provide valuable pest-control services within southeastern New Mexico and surrounding areas. Bats also consume mosquitoes, but not in large quantities, and other types of flies, which are known to parasitize livestock, further benefiting agricultural production (Russo et al. 2018). Overall, protecting bat species and ensuring populations persist, especially in agricultural areas, will benefit both agricultural producers and the environments they inhabit.

Temporal Considerations

When Are Bats Active in New Mexico?

Most bats in New Mexico follow the same general yearly activity timeline, as shown in Figure 1 below. An important note is that in New Mexico, not all bats are migratory. While many species of bat migrate south, others hibernate within sites known as hibernacula for the winter. Research and sightings have shown some bats remain active in New Mexico year-round (Geluso 2007, Metcalfe et al. 2023, Valdez et al. 2009). These bats enter a lighter version of hibernation called torpor on colder days and leave their roosts to forage for food on days when the weather is milder. Other bat species chose to hibernate in New Mexico. Research suggests there are over 200 bat hibernacula across the state, with most bats hibernating in caves (Weller et al. 2018).

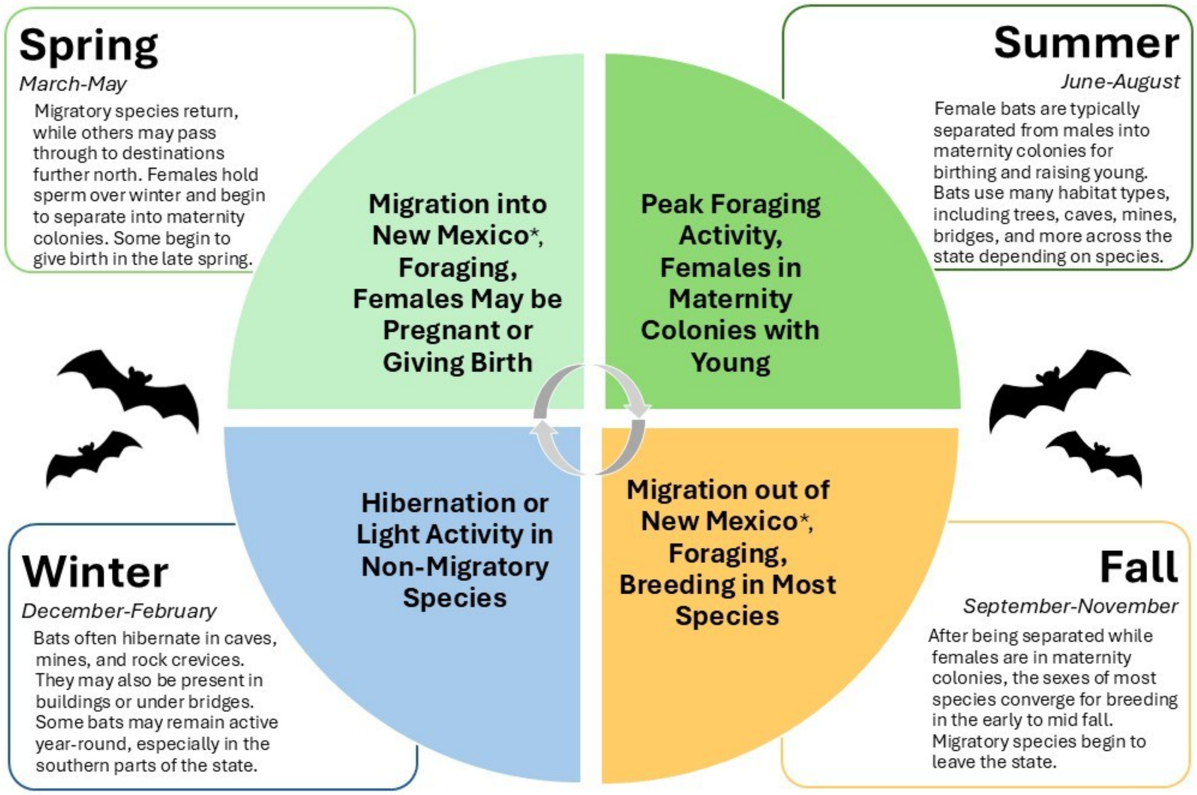


*Figure 1: Bat activity by season in New Mexico. * Note: Not all bat species in New Mexico are migratory.*

Protecting Bats

When Removal or Exclusion is Necessary

In some scenarios, bats will choose to roost or hibernate (Sherwin and Gannon 2005, Diamond et al. 2015), in human-made structures. While sometimes benign and transient, when bats stay in these areas long-term, accumulating guano and urine may warrant the exclusion of these animals. When in direct contact with humans, health and safety risks associated with human contact with bats also warrant removal and exclusion. Ideally, sealing any openings to the building when bats are not present, primarily during the winter for migratory bats, would ensure no bats could enter the building in the future. However, if bats are present during the winter, exclusions should take place in the early spring when bats become active and will be leaving and entering the building. During this time, exclusion techniques, examples of which can be found in Smallidge (2024), will allow bats to exit the building safely, but not re-enter. Any exclusion techniques should be overseen by a properly trained and permitted individual to avoid harm to the bats. Any trapping of bats, including as described in the above Smallidge (2024) document, should be performed by properly permitted biologists. A scientific collection permit may be required to capture bats; contact the Department's Wildlife Permits Manager at dgf.permits@dgf.nm.gov for more information. Exclusion techniques, along with ensuring all potential entrances are sealed and remain sealed over time, will successfully exclude bats from buildings. Exclusion should not be performed in the late spring and summer (May-July) when females form maternity colonies, give birth, and raise pups. Further information regarding safe bat exclusion can be found at BCI (2026).

If a bat is found in a building where humans may be present or if a bat is found acting strangely (i.e., approaching humans, on the ground, or appearing lethargic or unable to fly), the Department strongly recommends contacting the local health department and animal control or a biologist qualified and permitted for bat removal to ensure the bat is safely removed and released. Attempting to move the bat yourself may result in injury to you or the bat. While rabies and other bat-borne illnesses are rare, there is a risk of transmission and safety should be the primary goal for both the animal and any humans present.

In some scenarios, ultrasonic bat-deterrent devices may be used to limit bat presence in an area where other methods, including bat exclusion or shifting construction timelines to seasons when bats are not present, may not be feasible. Research has suggested that ultrasonic bat-deterrent devices may be useful for limiting bat presence prior to construction (Bektas et al. 2021), when installing wind turbines (Arnett et al. 2013), and in other scenarios of potential human-bat conflict (Gilmour et al. 2020). Department biologists may be available to provide suggestions on how and when to best use these devices.

When Demolishing an Existing Structure

If an existing structure (e.g., abandoned building or bridge) is torn down or modified, the Department recommends conducting pre-construction bat surveys to determine if bats are present. Maternity colonies may be found within buildings with females rearing young from approximately May-July. If bats are found in the focal structure, then work should be scheduled during the winter. However, another survey should be conducted directly before winter construction to ensure no bats are hibernating within the structure. If bats are present in the structure during the winter, construction should be postponed and exclusion techniques implemented as detailed in Smallidge (2024) and according to the timeline below. This is necessary to ensure bats are able to leave the area before young are born and construction activities proceed. Exclusion techniques should be overseen by a properly trained and permitted individual to avoid harm to the target bats. Department biologists may be available to provide suggestions regarding bat exclusions and may be able to facilitate contact with qualified personnel.

How to appropriately time bat exclusion:

- January-April: Migratory species come back to the state and separate into maternity colonies or bachelor roosts during this time. Seal potential entrances for these species before bats return to a building with a previously detected maternity colony or roost. If bats are hibernating in a structure, exclusion devices can be placed now to allow bats to leave when they exit hibernation but not re-enter the area.
- May-August: Watch bats to identify entrances. Do not seal openings during this time as young may be present within the materni-ty colony and could become trapped inside the building, causing unnecessary mortality and potentially causing a public-health hazard.
- August-October: Install one-way door(s) or other exclusion devices at bat entrances since young will be less dependent on their mothers and able to fly on their own to leave the roost.
- November-December: Migratory species leave the state to areas further south during this time. Seal bat entrances once bats have left for the year. If a winter hibernaculum is suspected in the focal structure, postpone exclusion into the early spring to avoid mortality.

When Disturbing Potential Habitat (Caves or Forested Areas)

When carrying out surface-disturbing activities (e.g., new construction, paving, trenching, and excavating), avoid potential roost sites as much as possible. The following can be signs an area is being used as a bat roost:

- Bats flying in or out of a cave, tree, or other structure, especially when there are multiple bats entering around sunrise and/or exiting around sunset.
- Bats observed within a cave, tree, or other structure.
- Guano piles found within or below a structure or urine staining observed on a structure. Bat guano (feces) looks like rodent droppings but is dry and crumbles easily. Bat urine stains may look like streaks that are white and chalky, sticky and glossy, or dark brownish-yellow. Do not attempt to touch bat guano or urine without proper personal protective equipment.
- Bats heard within a cave, tree, or other structure. Bats are generally quiet, but soft scratching, clicking, and/or squeaking may be audible.

Bat exclusion net installation under bridge. J. N. Stuart.

*Red bats (*Lasiurus frantzii*) in a cottonwood tree. K. Geluso.*

A bat's roost site will differ depending on the time of year and the species. In the spring and summer (May-August), breeding females and young may use trees or rock crevices where their young can remain warm and more protected from both predators and the elements. Non-reproductive females and males can form colonies in abandoned buildings, bridges, and culverts where they can take advantage of slightly cooler and more stable temperatures while still being protected (March-August). Some species of bats may use tree cavities and loose bark as both maternity roosts and other roost types (March-November). Non-migratory species may seek to hibernate within the state in areas with higher humidity and stable temperatures, including caves, mines, buildings, and bridges (December-February). Some species may utilize trees for temporary winter roots if not fully hibernating (Zabriske et al. 2019). Because of bats' roost flexibility, the Department recommends conducting surveys for bat presence and habitat suitability prior to construction or demolition, especially when any of the roosting, colony, and hibernacula sites listed above are present (i.e., abandoned buildings, bridges, caves, culverts, mines, rock crevices, and trees, especially those with loose bark or cavities). Department biologists may be able to provide assistance in determining areas that may be crucial to New Mexico bat populations.

Avoid the following activities within the specified buffer distances from potential roosting habitat, occupied roosts, and/or hibernacula:

- Activities that would create continuous noise greater than or equal to 70 decibels (Bennett and Zurcher 2013, Shannon et al. 2016, Lehrer et al. 2021) within 1.25 miles of known hibernacula (Thalken et al. 2018).
- Prescribed fires should not take place within 1.25 miles of hibernacula (Thalken et al. 2018) during the winter. Prescribed fire taking place outside of hibernacula buffer zones over the winter should be conducted on days when temperatures are above 10°C, and the fire should be started on a north-facing slope to give bats time to react and leave the area safely (Layne 2009).
- Activities that would disturb an area greater than 10 acres within a 1.5-mile buffer area around occupied roosts and hibernacula.
- Maintain a buffer zone of no less than 0.25 miles around known or occupied roosts for tree-clearing activities, especially of trees within suitable habitat for bats potentially found in the project area (further details on suitable habitat for bat SGCN given below). Ensure no more than 10 trees are removed within 150 feet of quality habitat and foraging sites (e.g., riparian areas, mixed-age ponderosa [*Pinus ponderosa*] stands, and mature pinyon [*Pinus edulis*]-juniper [*Juniperus* spp.] woodlands) at any time of the year. Leaving snags, hollow trees, and trees with peeling bark as bat roost sites is recommended. Retaining more than 5 snags per hectare is preferred (Rabe et al. 1998).
- Avoid the use of heavy smoke-producing equipment or open-flame torches, especially during times when young may be present or breeding could be taking place (approximately May-October), within 0.25 miles of an identified roost.
- When establishing buffer zones, use wildlife-friendly fencing or flagging to identify buffer zones around the project area.

Riparian bat habitat. K. Moffatt.

Bat roost back entrance. G. Seamster.

When Creating Alternative Bat Housing

In areas where habitat has been disturbed or when bats are excluded from a structure, bat housing can be constructed prior to exclusion and any structure demolition to provide alternative shelter and support bat populations. Bat housing can also be installed around agricultural areas where pesticides are not used to encourage bats as natural pest control. In addition, bat housing can be installed in areas impacted by wildfire to support the return of bats to these areas when suitable roosts (e.g. snags and trees with sloughing bark) may be limited.

The following guidelines may be used to determine the appropriate type and size of bat housing:

- For a colony equal to or greater than 1,000 bats, a large bat house, often called a "bat condo", is necessary to maintain the proper conditions (i.e., temperature, flight space, and humidity). These structures are the costliest to build but current designs allow for construction of structures as large as approximately 8 feet x 8 feet x 8.5 feet.

*Hoary bat (*Aeorestes cinereus*) hanging. K. Geluso.*

*Western small-footed myotis (*Myotis ciliolabrum*). K. Ingham*

- For colonies with less than 1,000 bats, multiple large, multi-chamber boxes should be provided; a standard Bat Conservation International four-chambered bat box can accommodate no more than 350 bats.
- Smaller bat houses may be suitable for small colonies or solitary bats displaced by construction, structure demolition, or removal from a structure.
- For smaller sizes of bat houses, three houses facing east, west, and south may allow bats to find suitable roosting temperatures as the sun moves throughout the day.
- Creating boxes out of lighter-colored materials or painting them lighter colors may ensure suitable temperatures in warmer, more arid areas of New Mexico.
- To support populations of tree-roosting bats, bat houses can be placed directly on trees to provide additional roosts for a variety of uses (Chambers et al. 2002, Diamond et al. 2015). Various models may be used depending on target species and tree size. However, if a tree-mounted bat house is used, additional considerations and mitigation measures may be needed to protect bats from predation.

Further information regarding the use of bat houses can be found in Holroyd et al. (2023).

When Using Pesticides

The potential negative effects of pesticides on bats are well documented, as are the multiple ways bats may be exposed to these chemicals (Olivera et al. 2021). Due to their potential to negatively impact bats and other species, the Department recommends alternative methods of pest control, including the construction of bat boxes (as described above) to encourage biological pest control via bat predation on insects, whenever feasible. However, in some scenarios, pesticides may be needed to protect humans, crops, and other forms of vegetation. In these cases, the Department has the following recommendations:

- Thorough surveys should be completed by a qualified, permitted biologist prior to any treatments to determine if special status species or species of concern (including SGCN) are present in the area.
- To mitigate the potential for pesticide drift into sensitive aquatic and native riparian habitats, the Department recommends apply-ing a minimum buffer of 20 feet (for spot applications), 100 feet (if using ground application), 350 feet (if using low-altitude aerial spraying), or 1,320 feet (if using high-altitude aerial spraying; White 2007) around all aquatic habitats and native riparian vegetation in the proposed treatment area.
- To mitigate the potential for impacts on insect-eating or nectar-eating bats, the Department recommends applying a minimum buffer of 10 feet (for spot applications), 90 feet (if using ground application), 300 feet (if using low-altitude aerial spraying), or 1,320 feet (if using high-altitude aerial spraying) around all known terrestrial habitats for these species, including caves, cliff fac-es with deep crevices, mixed-age ponderosa pine stands, mature pinyon-juniper woodlands, and habitat features described below for specific SGCN, especially those potentially found in the project area.
- Apply herbicides directly to target areas, rather than broadly to large areas, whenever and wherever possible to avoid harming nearby species and habitat.
- Avoid pesticide spraying on days when wind speeds are high (> 10 miles per hour) and on days when rain is expected within 48 hours.

- Use the lowest concentration possible that will still allow for the achievement of the desired result.
- The Department recommends not using the following classes of pesticides, which have been found to be, or are suspected to be, potentially harmful to bat species (Stahlschmidt and Brühl 2012, Williams-Guillén et al. 2016, Oliveira et al. 2021): organochlorines (e.g., dicofol, endosulfan, and methoxychlor), pyrethroids (e.g., permethrin, bifenthrin, and resmethrin), and neonicotinoids (e.g., clothianidin, imidacloprid, and thiamethoxam).

When Using or Installing Outdoor Lighting

Research has shown that artificial lighting at night, especially LED lighting, can have negative impacts on bats. Artificial lighting can cause bats to emerge later, limiting time for foraging, and can further fragment potential habitat for bats (Stone et al. 2009, BCT 2014). To minimize the impact lighting may have on bat species, the Department has the following recommendations:

- Avoid installing lighting in or around ecologically important areas like wetlands, riparian areas, or habitats where sensitive species may be present.
- Do not shine light directly onto or into bat roosts or hibernacula.
- Avoid the use and installation of artificial lighting outdoors unless absolutely necessary.
- Down-shield any installed lighting to ensure it remains within the boundary of the site, keeping all lighting to the minimum amount (i.e., brightness, number of fixtures, and time of lighting) necessary for the purpose of the activity.
- Use red light when possible, and avoid using white, blue-white, or ultraviolet-emitting lights.

Further information regarding the effects of lighting on bats and the use of various mitigation techniques can be found in Stone (2013).

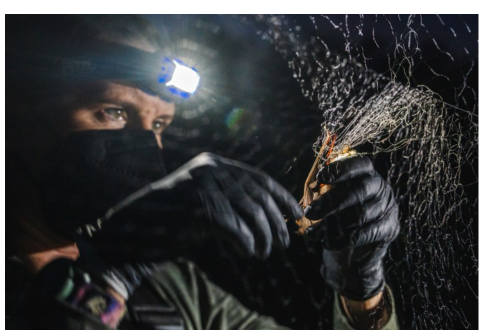
When Entering Caves or Mines

Pseudogymnoascus destructans (*Pd*) is a fungus that causes WNS in bats. WNS was first detected in the United States in 2006 (Lorch et al. 2016) and likely originated in Eurasia. The disease quickly spread across the United States, leading to the death of millions of bats and threatening the persistence of some species. *Pd* was detected in New Mexico in 2021, and the first occurrences of WNS were detected in 2023 (WNRT 2025). Limiting the spread of *Pd* is crucial for protecting bats throughout the state. While humans are not affected by *Pd*, they can carry it on footwear, clothing, and other materials and spread it to new locations. Thoroughly decontaminating all footwear, clothing, and gear both before and after entering areas where bats live, especially caves and mines, is crucial for protecting New Mexico bat species. The Department recommends following the National White-Nose Syndrome Decontamination Protocol (WNSDMWG 2024). These protocols include, but are not limited to:

- Inspect all gear and bags when leaving an area where bats are found and remove any sediment on items before leaving the area.
- For any items that can be submerged in water, place items in a water bath that maintains a temperature of at least 55 degrees Celsius (131 degrees Fahrenheit) for at least 5 minutes (with 20 minutes preferred) , ensuring all parts of the items are fully exposed to the hot water.
- For items that cannot be submerged, decontaminate according to the proper procedures or product-use guide found in the Decontamination Protocol document. For example: isopropyl alcohol (at a concentration of 70%) with items exposed for over 20 seconds or hydrogen peroxide (at a concentration of 3%) to wipe items down.

Keep in mind, all items should be decontaminated. For different projects, this may include inner and outer clothing layers, technical gear, scientific equipment, mist nets, harp traps, acoustic monitors, cameras, other electronics, and any personal protective equipment used.

Bat radio transmitter placement. M. Dalton.



Removing a bat from a mist net. Department.

Measuring the wing of a bat. M. Dalton

Species-Specific Considerations

Specific Considerations for Bat Species of Greatest Conservation Need (SGCN)

The 2025 SWAP (NMDOW 2025) includes 16 species of bats listed as SGCN. Below are some specific recommendations to protect each of these species:

Species	Additional Protection Recommendations
Allen's big-eared bat (*Idionycteris phyllotis*)	Snag retention may help protect this species, especially in evergreen forests above 7,000 ft in elevation (O'Shea et al. 2018). The placement of artificial roosts on trees may also support this species in habitats that may have less available natural roosts (Chambers et al. 2002, O'Shea et al. 2018). Human access to mines during cooler months may disturb bats and increase mortality (Metcalfe et al. 2023).
Arizona myotis (*Myotis occultus*)	This species is likely heavily affected by intense wildfires, specifically in ponderosa forests (Geluso 2022). To benefit tree-roosting bats, including Arizona myotis, sufficient numbers of large-diameter trees should be left on the landscape and allowed to die in place, likely more than 5 snags per hectare (Rabe et al. 1998, Johnson and Chambers 2017).
Big free-tailed bat (*Nyctinomops macrotis*)	Creating and maintaining open water sources over 45 ft in diameter may support this species (Corbett et al. 2008), as well as high rock crevices and cavities, which provide important maternity-roosting habitats (Sparks and Valdez 2003).
Cave myotis (*Myotis velifer*)	This species is common in many caves in New Mexico. It is known to be susceptible to WNS and may be negatively impacted by cave tourism (Mann et al. 2002). Proper decontamination protocols, as cited above, to prevent the spread of *Pd* may help protect this species.
Eastern red bat (*Lasiurus borealis*)	Protecting cottonwood (*Populus* spp.) stands and riparian areas may also support this species, but it is known to inhabit many areas, including general deciduous forests (Amelon et al. 2014). Retaining trees with dense foliage may help support this species (Valdez et al. 1999).
Fringed myotis (*Myotis thysanodes*)	The primary threats to this species are roost disturbance, habitat alteration, and toxic chemicals (Keinath 2003). Fringed myotis roosts are easily disturbed, especially by light (O'Farrell and Studier 1973), so eliminating or limiting light may support this species.
Hoary bat (*Aeorestes cinereus*)	This species is known to be strongly affected by wind turbines, especially during the mating season (Cryan 2008, Valdez and Cryan 2009, Reyes and Szewczak 2022). Preventing bat collisions with wind energy infrastructure should be a goal for this species and others. Forests are important in the summer while valleys are important habitats in the fall (Starbuck et al. 2022).
Lesser long-nosed bat (*Leptonycteris yerbabuenae*)	This species is a columnar cactus-feeding specialist and also feeds on agave. Protecting these plants, and the habitats they occur in, may help ensure the persistence of this species throughout its range (Burke et al. 2019).
Mexican long-nosed bat (*Leptonycteris nivalis*)	This species is an agave-feeding specialist. Protecting these plants, and the habitats they occur in, may help ensure the persistence of this species throughout its range (Burke et al. 2019).
Mexican long-tongued bat (*Choeronycteris mexicana*)	Increased land protection can help this species and protect the ecosystem services, including pollination, it provides (Burke et al. 2021).
Pocketed free-tailed bat (*Nyctinomops femorosaccus*)	Protecting cliff-roosting habitat (Kumirai and Jones 1990) and open water sources (Higginbotham and Ammerman 2002), especially in southern New Mexico, may support this species.
Spotted bat (*Euderma maculatum*)	Known to hibernate in the same areas from year to year and may be found hibernating in buildings (Sherwin and Gannon 2005). Tends to hibernate deep in cliff crevices, and protecting these areas from both disturbance and *Pd* will help protect the species (Bogan et al. 1998, Sherwin and Gannon 2005).
Tri-colored Bat (*Perimyotis subflavus*)	This species has only been recorded in eastern New Mexico (White et al. 2006, Valdez et al. 2009). Male tri-colored bats tend to roost solitarily in trees. Females often form groups in trees, caves, or buildings (Sandel et al. 2001, Veilleux et al. 2003, Gibizov 2013). Protecting riparian areas and surveying for bats prior to potential roost-disturbing activities may protect this species.

Western red bat (*Lasiurus frantzii*)	Increasing cottonwood recruitment and restoring flood patterns can help this species (Pierson et al. 2006). Protecting existing cottonwood stands and riparian areas may also support this bat (Jones et al. 2021).
Western yellow bat (*Dasypterus xanthinus*)	This species is known to roost in ornamental palms across its range, and checking these plants before removal may help protect individuals (Zabriske et al. 2019). Riparian habitat restoration may also support this species (O'Farrell et al. 2004, Ortiz and Barrow 2014).
Yuma myotis (*Myotis yumanensis*)	Maternity roosts for this species may be located under bridges, and many bats may use bridges during the warm summer months (Geluso and Mink 2009). Surveying for bats prior to bridge construction or demolition may help protect this species and others known to use bridges for roosts.

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