



Bat Management and Control

The Importance of Bats

Bats have always been the target of myths and stories. While there still exists among many an unreasonable fear of these mammals, there is also a growing awareness among the general public of bats' important role in the health of our ecosystem.

Bats are one of the major predators of night flying insects. Each night, bats can eat their weight in moths, grasshoppers, mosquitoes, cockroaches, centipedes, scorpions, and other insects and arthropods. One bat can eat 600-1,000 mosquito-sized insects in only one hour, so there is a major benefit in protecting this valuable resource (9). There are 28 species of bats that are full- or part-time residents of Arizona.

Bats play key roles in ecosystems around the world, from rain forests to deserts. They are important pollinators of several plant species, including Arizona's organ pipe and saguaro cacti. Bats feed on most species of flying insects, many of which are agricultural pests, and their seed dispersal activities are vital to many forest systems. In the health field, the study of bats has played a part in the development of navigational aids for the blind.

The Truth About Bats

Rabies is the most important public health hazard associated with bats, but its impact has been vastly exaggerated. More people die annually from dog attacks, bee stings, lightning, and household accidents than from bat-transmitted rabies. It is estimated that one bat in 200 may carry the rabies virus. Debunking the myths concerning bats may help us understand facts about the importance of bats in the ecosystem and about rabies and bats. The facts help us protect ourselves and our pets while learning the value of living safely with bats and how to control bats when they become a pest.

Here are a few *truths* about bats:

- Most bats do not have rabies
- Bats will not attack humans
- Bats are not blind
- Bats are neither rodents nor birds
- Bats will not suck your blood
- Bats will not try to fly into your hair



Figure 1. Arizona Myotis

All this said, it is important to be aware that there is the *possibility* that the injured bat you see on the ground may carry the rabies virus. In the last five years, there have been 179 confirmed cases of rabies in bats (Table 1).

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Table 1. Confirmed rabies in bats in Arizona by county, 1994-1998.*

	Apache	Cochise	Cocnino	Graham	LaPaz	Maricopa	Mohave	Navajo	Pima	Pinal	Santa Cruz	Yavapai	Yuma	Totals
1994	0	1	0	0	0	4	0	0	22	0	2	1	0	30
1995	0	1	4	1	0	12	3	3	10	0	1	1	7	43
1996	0	2	4	0	0	11	0	3	5	1	1	0	1	28
1997	0	1	0	2	0	13	1	0	20	0	0	5	1	43
1998	1	3	4	0	1	11	0	1	20	0	0	0	2	43
1999	1	1	12	3	1	51	3	7	77	1	4	7	11	179

*No cases reported for Greenlee County

Source: AZ Dept of Health Services

Bats and Rabies

Rabies is a deadly but preventable viral disease that attacks the nervous system. It is usually transmitted through the bite of a rabid animal, but it can be contracted from contact of a infected animal's saliva with mucous membranes or a fresh break in the skin. All mammals, including humans, are susceptible. Since the 1950's, the incidence of human rabies cases in the U.S. has declined significantly (1). The decrease parallels the decrease of rabies in domestic animals. However, recorded cases of rabies in wild animals have increased dramatically over the past 20 years, representing over 90% of confirmed rabies cases. Principal rabies hosts are wild carnivores such as raccoons, skunks, foxes and bats, infected with several virus variants. Most of the recent human rabies cases have been caused by rabies virus from bats and skunks. In Arizona, rabies in bats and skunks have predominated (Table 2).

Of 21 human rabies cases in the United States since 1990, 19 are attributable to bat rabies exposure. Four Americans died of rabies in 1995, and each case was linked to the virus variant associated with bats. The numbers of deaths are not significant compared to deaths from other causes. But since rabies is fatal if untreated, exposure to an animal that may have rabies should be treated with great caution.

How can I tell if a bat has rabies?

Although the incidence of rabies in a wild population of bats is very small, bats exhibiting abnormal behavior should be dealt with very carefully. Any bat that is active during the day, is found in a place where bats are not usually seen (such as in room in your house or on the ground), or is unable to fly is more likely to be rabid.

These bats are often the most easily approached. Therefore, it is best never to handle any bat. If you are bitten by a bat — or if infectious material (e.g., saliva) from a bat gets into your eyes, nose, mouth, or a wound — wash the affected area thoroughly with soap and water and get medical advice immediately. When possible, and without risk of further injury, the bat should be captured and sent to a laboratory for rabies testing. People cannot get rabies from having contact with bat guano (feces), blood, or urine, or from touching a bat on its fur, but bats should never be handled without gloves!

Exposures

Signs of rabies infection in bats include:

- grounded unable to fly (frequently these are flapping around or laying on the ground)
- erratic behavior (flying around a person or pets *during the day* or crashing into objects)
- anorexia (not eating)
- partial or complete paralysis

Table 2. Confirmed rabies cases by species and year in Arizona.

	1994	1995	1996	1997	1998	Totals
Bat	30	43	29	45	43	190
Skunk	30	43	29	5	3	110
Fox	3	2	0	0	0	5
Bobcat	0	0	0	0	1	1
Coyote	2	1	0	0	0	3
Horse	0	1	0	1	1	3
Other	0	1	0	0	0	1
Total by Year	65	91	58	51	48	313
Bats as % Total	46	47	50	88	90	61

Arizona Department of Health Services

The Centers for Disease Control and Prevention has stated that post-exposure rabies treatment is appropriate even in the absence of a demonstrable bite or scratch, in situations where there is reasonable probability that contact occurred. The limited injury inflicted by a bat bite may make it difficult to determine the risk of rabies from an exposure to a bat. Such encounters may include: a sleeping person awakes to find a bat in the room or an adult witnesses a bat in the room with a previously unattended child, mentally disabled person, or intoxicated person.

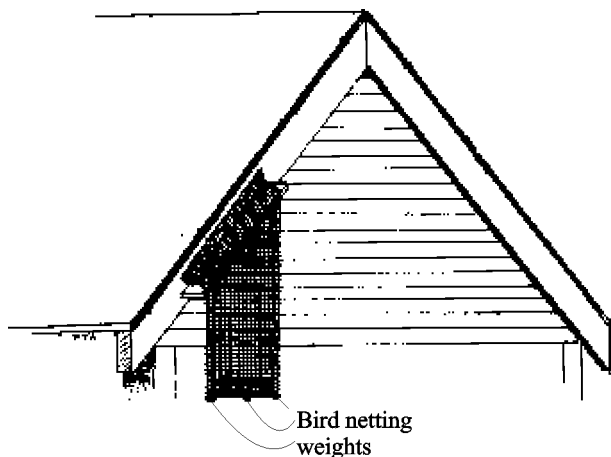


Figure 2. Frontal view of check valve.

How can rabies be prevented?

- Teach children never to handle unfamiliar animals, wild or domestic, even if they appear friendly.
- Wash any animal wound thoroughly with soap and water and seek medical attention immediately.
- Have all dead, sick, or easily captured bats tested for rabies if exposure to people or pets occur.
- Prevent bats from entering living quarters or occupied spaces in homes, churches, schools, and other similar areas where they might contact people and pets.
- Be a responsible pet owner by keeping vaccinations current for all pets.

Dealing With Unwanted Guests

Bats are active at night and seek dark and secluded roosting areas during the day. Caves and trees are their natural roosting habitat. Most bats are able to squeeze through slits and cracks no wider than 3/8 inch. They may enter a house through the overhang of the roof or eaves. Inside they are most often found in attics, between roofs and ceilings, in crevices around the roof, in walls, in chimneys, and occasionally in crawl spaces.

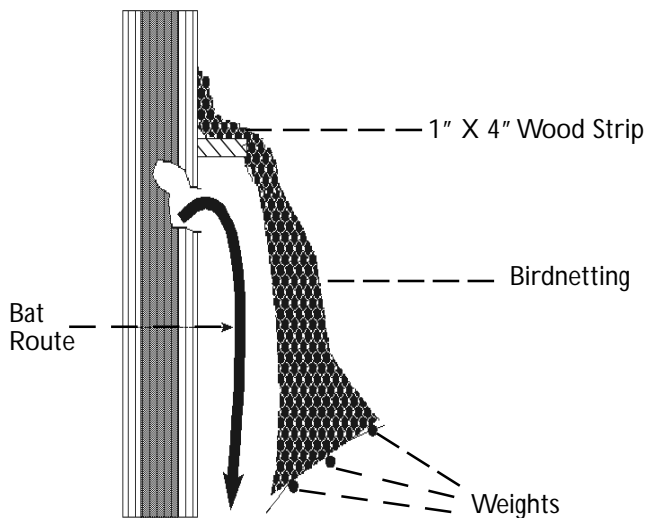


Figure 3. Side view of check valve.

Outside they may roost behind shutters or under wood shingles, roofing, drain gutters, awnings, overhang trim, and flashing around chimneys. Bats also fly around swimming pools to drink and to catch insects. Street and porch lights may attract flying insects which, in turn, attract bats. Bats may become a nuisance by their squeaking, scratching, scrambling, and crawling in attics, walls, and chimneys. Bat droppings can accumulate and cause quite a stench in buildings and an unsightly mess on the outside of buildings.

Excluding an Entire Colony from Your House

Bats can be excluded from living quarters by sealing any possible entry points and by installing chimney caps and draft guards beneath doors. Look for possible entry points along roof lines where the roof covering meets the fascia board and around screen doors, windows, and plumbing. Bats do not chew insulation or otherwise make new holes. Their entries can be plugged with silicone caulking, steel wool, or, temporarily, even with tape. If a large bat colony must be evicted from a wall or attic, careful observations should be made at dusk to find entry holes (also sometimes recognizable by stains around used holes or crevices or by droppings beneath). The bats must emerge each summer evening to feed. Once roost entrances have been located, the bats can be excluded, though this should **not** be attempted when flightless young may be present (May through August). Starved young could create a serious odor problem, not to mention needless cruelty.



Figure 4. Free-tailed bat.

When bats are present in a structure, they may be excluded by a one-way, check valve (Figs. 3, 4) made from ½ inch mesh, polypropylene bird netting. Seal all spaces that might provide access except for a few that appear to be major entry/exit holes. Check valves over these holes left open will permit bats to exit but exclude them from returning. To install a check valve, secure a strip of netting above the hole with duct tape, staples or wooden lath. The strip of netting should be wide enough to extend out at least two feet on either side of the exit hole and long enough to extend at least two feet below the hole. Lead fishing weights can be secured to the bottom of the netting to keep it hanging straight down. The netting should be held about 4 inches away from the vertical surface by installing a 1 by 4 inch board above and parallel to the hole. This will allow exiting bats to drop down, clear the bottom of the netting and escape, but they will be unable to find their way back up to reenter. After it has been confirmed that all bats have exited, or the check valve has been in place for at least a week, the holes can be sealed to permanently exclude bats. To avoid leaving flightless young in the roost, this should only be done from September to early May.

Other methods

Harmless repellent devices would seem ideal, but none are known to be effective. Ultrasonic sound generators thus far tested by reliable bat experts have proven ineffective and some may endanger people or even attract bats. Naphthalene flakes or crystals have been somewhat effective in very tightly enclosed spaces. However, the material must be replaced often and the amount needed to be effective may irritate people in the structure and should not be used where humans will be routinely exposed. Aerosol dog and cat repellents may discourage bat use of a particular roosting spot for periods of up to several months. They have been used effectively to prevent bats from night roosting above porches. The spray is applied by day when bats are not present. Aerosol repellents are not an

adequate substitute for exclusion in the case of day roosts and never should be applied when bats are in a roost. In structures, such as warehouses, where doors and other entries must be open for long periods and exclusion is not possible, illuminating with bright lighting and providing ventilation with fans to roosting sites may repel bats.

Poisons used against bats pose serious health hazards to humans and are not effective in eliminating bat colonies. There are currently no toxicants registered for use against bats. Several species of bats are listed as endangered and all bats in Arizona are protected and may not be killed or collected. The only safe, permanent solution is exclusion.

Conclusion

The number of rabies-related human deaths in the United States has declined from more than 100 annually at the turn of the century to one to two per year in the 1990's, despite major outbreaks of animal rabies in several geographic areas. Modern, *post-exposure* prophylaxis has proven nearly 100% successful; most human fatalities associated with rabies now occur in people who fail to seek medical assistance, usually because they do not recognize a risk in the animal contact leading to infection. Anyone handling a bat with bare hands should consider seeking medical advice. This is especially true if children have come in contact with a bat and the occurrence of a bite cannot be determined. Medical assistance is recommended whenever a bat is found in a room where someone, especially a child or a person suffering from an infirmity, has been sleeping. Pre-exposure prophylaxis, with periodic boosters, is available for persons who may be at high risk of bats exposure.

Bat populations are on the decline throughout the United States. Loss of habitat due to the disturbance of natural and man-made roosting sites in buildings, old trees, and caves is a major factor in this decline. Another factor is active and persistent persecution by people not aware of the bat's gentle nature and beneficial activities. But an informed public can live with bats, appreciate their contributions, and avoid any hazards associated with bat contact.

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