



BATS: NEW ALLIES IN THE VINEYARD?

They're the villains of folklore, the object of fear, the source of superstition. Their nearly 1,000 species account for almost one-quarter of all mammal species, but their populations are in sharp decline globally. They are bats, indispensable to agriculture and ecosystems worldwide and the subject of interest in California as to the role they might play in viticulture.

As a growing number in the wine community embrace sustainable and organic agriculture, chemicals are being replaced by natural means of controlling vineyard pests whenever possible. Native cover crops carpet spring vineyards, providing habitat for beneficial insects, preventing hillside erosion and enriching vineyard soils. Barn owl boxes and hawk perches increasingly punctuate Napa Valley vineyards, offering roosts for natural avian predators of vine-damaging gophers. While all have proven effective allies to grape growers, the role of bats is far less known.

"Research into how bats forage in vineyards has been going on for several years now, and we know that a lot of bat species are taking insects in and around the vineyard," says Wildlife Consultant Greg Tatarian. "We just don't know yet precisely which insect species they're taking."

Employing a sonar system described as 1,000 times more sophisticated than any invention of man's, some of the smaller insectivorous bats can catch and eat up to 3,000 insects or 25-40% of their weight a night. Nearly three-quarters of bat species are insectivores, some species capturing insects mid-air, while others snatch them off the surface of foliage. Although their appetites are large, the bats found in Northern California vineyards are lightweight, all of them under an ounce, with some of them weighing no more than the cork from a bottle of wine.

Bats' voracious appetite for insects has proven a boon in commercial fruit orchards and row crops, where the winged mammals play an important role in consuming huge numbers of crop-damaging insects like codling moths and corn-borers. But the diet of bats foraging in vineyards is unknown, since no prey studies have yet been done. With many vineyards working to attract predacious insects, a question immediately arises: might bats prey on the beneficial insects so carefully cultivated in cover crops?



PHOTO: ROBERT BLOOMBERG

Pallid bat

Wildlife Consultant Tatarian thinks it's unlikely. "Both the flight and the ultrasonic vocalizations of bats are hugely consumptive of energy, and beneficial insects like the parasitic wasps are very small," he notes. Needing larger prey to fuel their flight, bats in California take moths as their primary food source, he said. "And bats feed at night, not during the day when beneficial insects are active. There's no reason not to want bats in the vineyards, even though the direct benefit is still unknown."

Proponents of bats often cite their enormous predation rate on mosquitoes, in a well-

meaning attempt to convince people to view bats as allies, said Tatarian. "But the truth is that while moths are a high energy source, bats find very little energy in the small mosquito, and the same is probably true about beneficial insects in the vineyard."

Seldom seen during daylight hours, bats have been an object of fear since Bram Stoker first linked the vampire myths of Hungarian and Rumanian peasants with a bat that fed on human blood in his 1897 novel *Dracula*, a legend furthered in Hollywood.

In reality, bats are shy, gentle and intelligent mammals characterized as devoted mates. Of the 1,000 bat species found worldwide, only the three vampire bat species of Latin America, first viewed and described by Charles Darwin in the 1830s, feed on the blood of other mammals, typically livestock.

Despite their ghoulish image, vampire bats are among the few mammals in existence known to adopt orphans and help feed members of their community unable to find food, a behavior shared with wild dogs, monkeys and humans.

Myths on bats abound: they are not interested in a human's hair, but rather in the insects attracted to our breath. Their incidence of rabies is on a par with other wild animals, about one instance in 1,000. They are more closely related to humans than they are to rats and mice. They don't chew wood or insulation in houses, but may take advantage of accessible roosting areas.

In truth, bats play important roles worldwide as pollinators, seed dispersers and in the control of insect populations; their presence is considered an indicator of a healthy ecosystem.

Nectar-feeding bats are essential to the pollination of many tropical plants such as bananas, mangoes and avocados, while fruit-



PHOTO: ROBERT BLOOMBERG

Mexican free-tailed bat

eating bats are the major seed dispersers of hundreds of plants and trees. Plants as diverse as the desert cactus and the Australian eucalyptus rely on bats for pollination, and they are critical to the survival of tropical rain forest ecosystems.

Yet, despite their key role in the environment, bat populations are threatened worldwide. Their slow reproduction rate makes them extremely vulnerable to extinction: most bats bear a single young each year and 60% do not survive infancy. And, because they congregate in large colonies, bats are easily exterminated in massive numbers, often due to ignorance or fear.

Over half of American bat species are in severe decline or already endangered, a fact biologists view with concern, since the animals' presence reflects a healthy ecosystem. Organizations such as Bat Conservation International (www.batcon.org) are hoping to reverse that trend through education and by encouraging people to conserve and enhance bat habitat.

Shelter, food and water are the three most important components of a bat-friendly environment and it is with the shelter element that humans can most readily have an impact. Roosting requirements are specific to each species, but most bats are opportunistic, readily adopting man-made structures such as bridges and buildings.

Research has shown that vineyards provide potential bat habitat. Insect life is abun-

dant, particularly in vineyards farmed without chemicals, and irrigation ponds provide a ready source of water. A man-made bat house offers the opportunity to entice bats into taking up residence.

But while nesting boxes have proven enormously successful in attracting barn owls and insectivorous birds, "bats are more finicky about their houses than barn owls and other birds," observes researcher Tatarian. The houses must be constructed to exacting specifications, placed in a suitable site away from human contact and even then, it may be years before the houses are occupied.

Bats utilize roosts during the day for security and also at night to process food, conserve energy and communicate, with many species often roosting together.

A primary goal in constructing bat houses is attracting maternal colonies, which choose warm areas for raising their pups, who must maintain a body temperature of 100 degrees to survive. Some species of bats are solitary tree-roosting bats, and these bats, along with bachelor colonies, require less warmth for their roosts.

Twelve to 14 bat species can be found foraging in Napa Valley vineyards, all of them insectivores. The species that have taken up residence in Napa Valley bat houses are the Pallid (*Antrozous pallidus*) and Mexican free-tailed (*Tadarida brasiliensis*). Successful in building the first artificial roost utilized by a maternity colony of Pallid bats in 1995, Tatarian has refined the bat house design over the years, making additional changes in the plans he provided Shafer.

Constructed like a huge club sandwich of plywood panels spaced roughly one inch apart, a bat house must be well-drained, located so it is warmed by the sun, and either attached to a building or mounted on a pole to deter predators. Bats enter and exit from the bottom, clinging to the panels, which must be covered with plastic screening to afford the bats a grip. Like owl boxes, they must be monitored and maintained.

Although once intrigued by the possibility that bats might prey on the sharpshooters that transmit Pierce's Disease to vineyards,

Tatarian today believes that insectivorous birds such as bluebirds and swallows are more likely to have an impact on sharpshooter populations. Toward that end, Shafer will mount nesting boxes on the perimeter of the vineyards to attract those insectivores in time for nesting season next spring.

But bats are more problematic. Constantly refining the design of the house, Tatarian has had success establishing bat populations elsewhere in the Napa Valley. "It's clear they're consuming huge numbers of flying and terrestrial insects in and around the vineyards and they're an important adjunct to habitat conservation for agricultural species," he says.

Utilizing radio transmitters and tagging bats to gather data on roost and foraging locations, he continues to research what the USDA's Natural Resources Conservation Service calls "one of the least studied and most misunderstood mammals, particularly in the United States."



PHOTO: GREG TATARIAN

Bat house

"Bats are strong environmental bio-indicators, since they're very niche-oriented," notes Tatarian. "And when niche-oriented species decline as bats have, it's a strong indication that the environment has been affected."

Considered by researchers to be among the most beneficially influential mammal species to humans, plants and other wildlife, the much-maligned bat may find a welcome in the wine country.