

NONGAME LEAFLET #11

IDAHO'S BATS

DESCRIPTION, HABITATS & CONSERVATION



INTRODUCTION

Bat. In the minds of many people, the very word conjures up a frightening mental image:

a rabies-infected, blood-sucking, hair-tangling horror, bent on terrorizing anyone in its flitting, haphazard path. A creature long linked to witches, vampires and foreboding darkness. Yet none of these descriptions is credible. Without a doubt, bats are the Rodney Dangerfields of the animal world—they “just don’t get no respect.”

True, many of their unique features serve to further that creepy image. For example, North America’s 44 bat species are active almost exclusively at night, have wings of skin rather than feathers and roost in rock crevices or caves, often in huge groups.

Yet beyond the clouds of misunderstanding and hype, a very different creature emerges. In fact, studies have shown bats greatly *benefit* humans.

For instance, most bat species are insect eaters, greedily consuming mosquitos, beetles, moths and leaf-hoppers. While a lone bat has little impact on insect populations, several million bats do: on a single evening, 20 million Mexican free-tailed bats living in central Texas’ Bracken Cave consume 250 tons of insects. Left unchecked, the insects could cost farmers and foresters billions of dollars in annual production. Other bat species sip nectar. They are essential for the

proper pollination of valuable plants whose fruit we eat. More than 450 commercial products—including fibers, dyes, fuels and medicines—are derived from bat-dependent plants.

As a group, bats are exceptionally resistant to disease, although like all mammals, a few (less than one percent) carry rabies. Yet even sick bats are not aggressive, presenting little threat to humans. To avoid any possible disease transmission, simply leave bats alone.

The expression “blind as a bat” characterizes another myth. In fact, the opposite is true. Bats have not one, but *two* forms of “sight.” They use them singly or in concert to navigate safely and to intercept prey. While in flight, bats emit high-frequency sound waves that strike objects in their path and return to the bat. Quickly processing this information, bats determine the size and shape of moving and stationary objects as fine as a human hair, even in total darkness. To counter this sophisticated radar system, some insect species have developed the ability to detect bat sound waves and then maneuver to avoid capture. For this reason, bats often choose not to use their radar system, relying instead on their keen eyesight to locate and apprehend their quarry.

All in all, bats are mighty interesting creatures. The 14 species that call Idaho home are particularly beneficial to humankind. Once you know more about them, you’ll see what we mean. Bats *do* deserve respect!

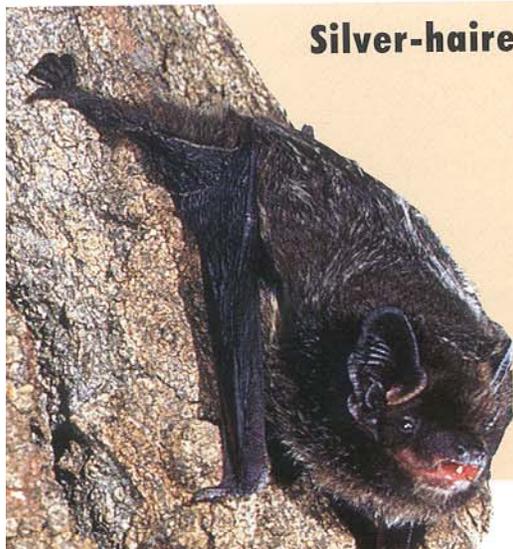
Yet beyond the clouds of misunderstanding and hype, a very different creature emerges.

DR. J. SCOTT ALTENBACH

Silver-haired bat (*Lasionycteris noctivagans*)

Late in the evening—three to eight hours after sunset—this bat forages for small- to medium-sized flying insects over small water bodies in conifer forests. Daytime finds it roosting alone or occasionally in groups of three to six in tree foliage, cavities, under loose bark or sometimes in buildings. Silver-haired bats are relatively cold-tolerant and may be active at low air temperatures. One or two young are born

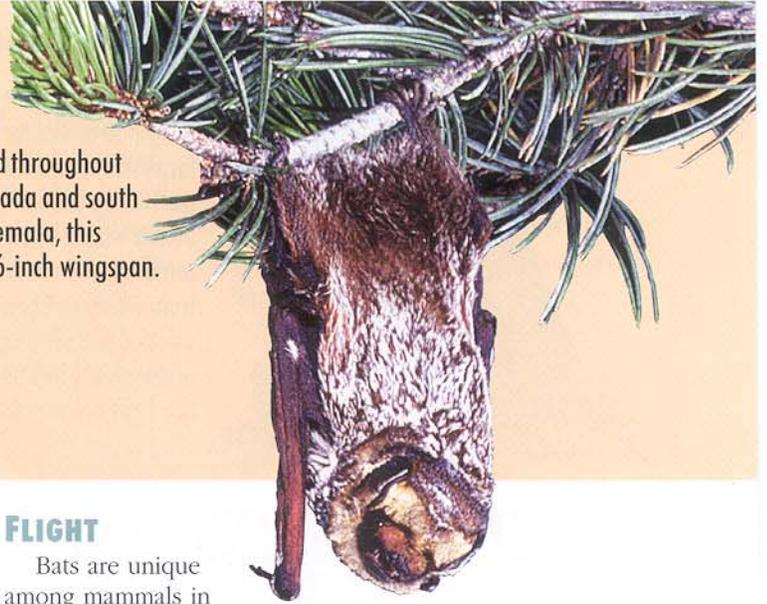
in June or July. They can fly at about three weeks and become sexually mature in their first summer. This species occurs throughout the U.S. and most of southern Canada, overwintering in its southern range. In Idaho, its distribution is not well known.



Hoary bat (*Lasiurus cinereus*)

This swift flier usually emerges well after dark to forage around clearings or lights (in rural areas) for large moths and other insects. Its day roost may be a mile or more away in deciduous or conifer tree foliage, often at the edge of a clearing. Hoary bats may roost in rock crevices but rarely in caves. A litter of one to four pups (usually two) is born in May or June in Idaho. They can fly at

four weeks. Females sometimes carry young on feeding flights. Found throughout the U.S. to northern Canada and south through Mexico to Guatemala, this large bat has a 15- to 16-inch wingspan.



TAXONOMY AND DISTRIBUTION

When scientists study bats, they begin by deciding where they fit into the animal kingdom. Bats belong to the order Chiroptera (say Kir-*op*-ter-a). This is one of the most diverse groups of mammals, second only to the rodent group in the number of different species it contains. There are almost 1,000 species of bats. They live nearly everywhere in the world except polar regions, extreme deserts and some isolated islands.

The order Chiroptera is divided into two suborders. Members of the suborder Megachiroptera are generally large bats. "Mega" means big, and with a wingspread of up to 6 feet, these species certainly qualify! Megachiroptera have large eyes, small ears and fox-like faces, thus the name "flying foxes." With a couple of exceptions, the bats in this group do not use sound-wave radar, called echolocation. The 150 species in this group inhabit tropical Africa, Asia, Australia and the Pacific islands.

The other suborder, Microchiroptera, contains more than 750 species. They have a nearly worldwide distribution, with the most diversity in the tropical regions. As the prefix "micro" suggests, these bats are generally small—the tiniest weighs no more than a penny, the average wingspan measures 12 inches—with small eyes and complex ears. Bats in this group are capable of echolocation. All of Idaho's 14 species of bats are Microchiroptera.

FLIGHT

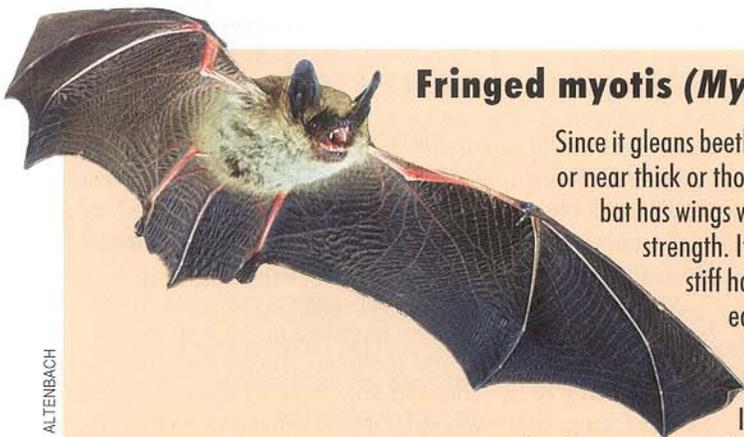
Bats are unique among mammals in their ability to fly.

Flying squirrels and flying lemurs glide and are not capable of true flight.

A bat's wing is a thin membrane of skin stretched between bones that are the equivalent of our forearm and finger bones. (Chiroptera means "hand wing.") The wing membrane attaches the "fingers" to the legs. A second interfemoral membrane stretching between the legs and tail is sometimes used to catch insects while the bat is flying.

The ability to fly gives bats many advantages. Bats can travel great distances to find food and roost sites. Some bats travel many miles a night to feed. Others migrate hundreds of miles between their summer and winter roost sites.

Bat species have developed various wing shapes to support different foraging and flight needs. For example, short, broad wings allow highly maneuverable flight. Bats with this shape of wing can forage for food where obstacles must be avoided, such as in the shrub or tree canopy, where they often glean food from branch surfaces or the ground. On the other hand, bats with long, narrow wings are usually fast flyers. They feed while on the wing and can cover great distances as they forage.



Fringed myotis (*Myotis thysanodes*)

Since it gleans beetles from the ground or near thick or thorny vegetation, this bat has wings with high puncture strength. Its name comes from stiff hairs on the trailing edge of the interfemoral membrane. In Idaho, fringed myotis has been reported only near Lewiston and McCall, roosting with other species. Until its

distribution is better known, it is classified as a Species of Special Concern. Maternity colonies may reach several hundred, with births in late June to mid-July; they disperse in October to hibernate. Fringed myotis roosts in caves, mines, rock crevices and buildings at 3,600- to 6,400-foot elevations from south-central British Columbia through the western U.S. to southern Mexico; winter range is not well known.



Big brown bat (*Eptesicus fuscus*)

True to its name, the big brown bat's wingspan measures 13 to 15 inches. Its large size, powerful jaw muscles and robust teeth allow predation on beetles and larger insects with tough exoskeletons. Relatively common, even in large cities, it is found from southern Canada to South America in wooded and semi-open habitats, especially in deciduous forests. Most activity occurs two hours after sunset for less than two

hours a night. Caves, mines and buildings are used for hibernation. In summer, big brown bats prefer cool roosting sites in buildings or hollow trees, rock crevices, tunnels or cliff swallow nests. One pup is born in May, June or July; young fly at 4 to 5 weeks.

ECHOLLOCATION AND OTHER SENSES

Echolocation is not unique to bats. Shrews, some whales, birds and even blind humans use echolocation to move about in and "see" their environment (bats have contributed to the development of navigational aids for the blind).

Echolocation has two steps that work like this. First, a bat emits high-frequency sounds produced in its larynx. These sounds are usually at frequencies too high for humans to hear. Most species emit the sounds from their mouth. A few emit them through the nose. These bats have elaborate facial features that seem to aid in the process.

Second, the waves of sound hit objects and the bat receives the returning echos. It uses them to move about in its environment and to determine an object's distance, size, texture, and speed and direction of movement. This system is so sensitive that bats can detect objects as fine as human hair.

Their ability to echolocate allows bats to use habitats and foraging strategies not available to animals that depend on

vision. Bats can roost deep in dark caves and mines, where they are relatively protected from predators. Bats can forage at night, feeding on insects that are also nocturnal.

Detectors that convert bats' ultrasonic calls into sounds audible to humans are used for research. Amateur naturalists also can use a bat detector to "eavesdrop" on foraging bats on a summer evening. A palm-size detector with jacks for tape recorder and headphones is available from Bat Conservation International for about \$265.

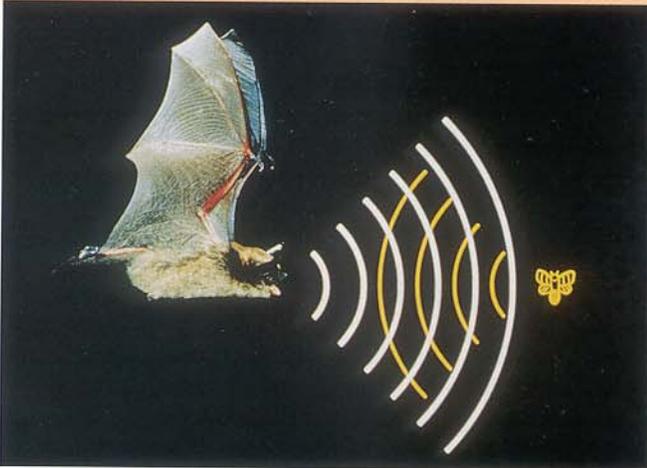
Bats are not blind. All species can see and use vision in many situations. The large eyes of Megachiroptera and their inability to echolocate indicate they rely on vision.

In addition to echolocation calls, bats vocalize during mating, to aid mother/young recognition and for other social interactions.

Hearing appears to be highly developed. Some species locate food by the sounds their prey produces.

As in other mammals, the sense of smell appears to be highly developed in bats. Fruit bats use smell to help find food and choose the ripest fruit to eat. Smell also appears to play a role in social interactions, such as mother/young recognition, courtship and mating. Some bats have glands apparently used for scent marking.

MEDICAL RESEARCH



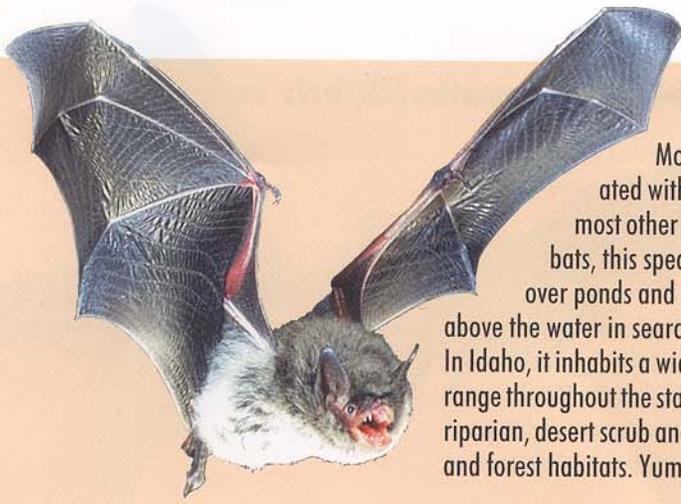
Bats' long lives and disease resistance make them important for research. For example, they have contributed to vaccine development and studies of aging, artificial insemination and speech pathology.

Lessons learned from bats' echolocation technique have produced navigational aids for the blind. Their principle is based on the high-frequency sounds many bat species produce in their voice box. Released in short pulses repeated at varying rates—from one per second to several hundred per second as the bat closes in—the sounds return as echoes to the bat, which uses them to determine the target so accurately that it can detect insects the size of gnats.

FOOD HABITS

As might be expected of such a diverse group, bats have very different diets and feeding strategies. Megachiroptera feed almost exclusively on fruit (frugivorous), but some feed on nectar and pollen (nectarivorous) as well. Some species of both Megachiroptera and Microchiroptera occasionally feed on leaves (folivorous), but none feed exclusively on them. Almost all species of Microchiroptera feed on insects (insectivorous), but some feed on fruit, nectar and pollen. Others specialize by feeding on fish (piscivorous), frogs, birds, small mammals or other bats (carnivorous). Three species (the vampire bats) are specialized to feed exclusively on blood (sanguinivorous): two feed on birds and one on mammals. Vampire bats are found in Central and South America, not in North America.

All of Idaho's 14 species of bats are insectivorous. These bats feed on a variety of prey, including mosquitos, moths, beetles, spiders, crickets and scorpions. They feed by capturing flying prey or by removing prey from a surface (gleaning) such as foliage or the ground. One oft-quoted estimate is that a little brown bat can consume up to 600 mosquitos in an hour. It also has been estimated that a female with young may consume more than her body weight nightly.



Yuma bat (*Myotis yumanensis*)

More closely associated with open water than most other North American bats, this species often forages over ponds and streams, flying just above the water in search of small moths. In Idaho, it inhabits a wide elevational range throughout the state including riparian, desert scrub and moist woodland and forest habitats. Yuma myotis leaves

daytime roosts to feed in early evening. Maternity colonies form in April. Females first breed in their second summer, producing one pup in late May-July. Colonies disperse by September 30. This species is found from British Columbia south through the western U.S. to Mexico.

Riparian areas, wetlands and other water sources often have an abundance of insects, so these areas are important foraging areas for bats. They also visit these areas to drink water, which is usually done in flight.

REPRODUCTION

Bats display some of the same reproductive characteristics as humans. They are mammals, so they produce live young (called pups), which feed on their mother's milk. Most bats produce only one pup a year. For a such small mammal, this is an unusually low reproductive rate, but bats have a long life span. Banding records indicate bats can live as long as 20 to 30 years, and 15 years is not unusual.

Reproductive patterns are variable, as might be expected with such a diverse group of animals. Some tropical species have more than one litter per year. Some species have delayed fertilization or delayed implantation. The length of gestation can vary both within and among species in response to environmental conditions. This helps synchronize the timing of birth with food availability.

Idaho's bats mate during the fall and winter, often at their hibernation roosts. The female stores the sperm throughout the hibernation period. Fertilization occurs after females emerge from hibernation, when the sperm is released and ovulation occurs. Females then move to roosts suitable for raising their young, usually occupied by other females. These are called maternity roosts. Gestation is typically one and a half to two months. The pups are born in the late spring or early summer when insects are abundant.

FOOD FROM BATS

MERLIN TUTTLE/BAT CONSERVATION INTERNATIONAL



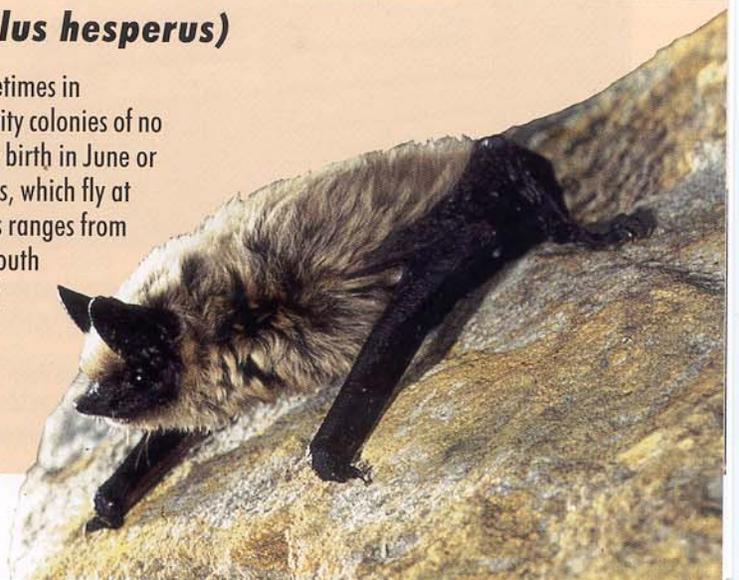
Your grocery store wouldn't be the same without bats. Fruit-eating bats are nature's most important seed-dispersing mammals. Nectar-eating bats pollinate thousands of tropical trees and shrubs. Bat-dependent plants include peaches, bananas, mangos, guavas, avocados, dates, figs, cashews, carob and cloves.

This greater short-nosed fruit bat, native to Asia and Thailand, pollinates a wild banana.

Western pipistrelle (*Pipistrellus hesperus*)

This smallest North American bat weighs little more than a penny and has a 7.6- to 8.6-inch wingspan. Flying erratically like a butterfly, the western pipistrelle eats small swarming insects. It emerges well before dark, visits water and drinks, and remains out later in the morning than other bats. Day and night roosts in southwestern Idaho deserts and canyons include rock crevices, under

rocks, in burrows and sometimes in buildings or mines. Maternity colonies of no more than 12 females give birth in June or July; females produce twins, which fly at about 1 month. The species ranges from southeastern Washington south to Mexico. It is a Species of Special Concern in Idaho.



Long-legged myotis (*Myotis volans*)

Although it is the most common bat in the western U.S., this species' Idaho distribution is poorly known. The moth-eating bat may change habitats seasonally, from coniferous forests at 6,600- to 9,900-foot elevations to the Baja California desert. Active most of the night, its foraging peaks in the first three to four hours after sunset as the bat moves for relatively long distances over, through and around forest canopies and clearings, and over water.

DR. J. SCOTT ALTENBACH

Summer daytime roost sites include abandoned buildings, rock crevices and under bark, but not caves. One pup per female is born in May to August; its lifespan may be as long as 21 years. Nursery colonies may include several hundred bats.



After the young are born they usually stay in the roost while the female forages each night. Some females return during the evening, nurse their young and then return to forage some more. The pups can usually begin flying at about three weeks. The period when a young bat is learning to fly and feed independently is a critical time. Pups are vulnerable to predators and must become efficient at feeding in order to store enough fat to get them through winter.

ROOSTING HABITAT AND BEHAVIOR

Bat distribution is defined by the availability of foraging habitat and roost sites. Just as bats exhibit great diversity in size, diet and reproductive patterns, they also exhibit diversity in roosting habitat and behavior. Caves, mines or old buildings are the roosts we most associate with bats. Other roost sites include tree cavities and foliage, and under loose tree bark and bridges. Some tropical bats even "build" their own roosts by chewing along the veins of large leaves so they fold up and create a "tent."

Bats use roosts for different reasons at various times of the year and they often use different sites for day roosting than they do for night. Roosts suitable for maternity colonies are

generally warm and associated with a good foraging area and water availability. Roosts for hibernation, called hibernacula, typically offer a stable environment that remains above freezing through the winter. One extremely important factor influencing the suitability of a roost site is the amount of human disturbance it receives. Bats at maternity roosts and hibernacula are easily disturbed and may abandon a roost if disturbance occurs.

Torpor, a physiological state of reduced metabolic rate and body temperature, is used by bats to conserve energy. Torpor can vary in intensity from shallow to deep, and in duration from short-term to long-term, depending on the bat's needs.

Bats go into shallow, short-term torpor during the day when they are roosting. In hibernation, they use deep, long-term torpor to conserve the fat reserves they need to survive through the winter when food supplies are insufficient. From time to time during hibernation, bats arouse from torpor. They drink water, often from droplets in the cavern, urinate, may fly out of the roost, then return to torpor. Each time they arouse they use relatively large quantities of fat. Bats can store only enough fat for a few arousals, so if they are aroused more often than "scheduled," they may not survive. The noise, lights and change in cave temperature associated with people entering a hibernaculum can be enough to trigger bats to arouse from torpor. Since arousal can take a relatively long time, caverns usually are unaware of their impact.

BAT AND HUMAN HEALTH CONCERNS

Bats sometimes establish roosts in human-occupied buildings and become a nuisance to the people who live there. When this occurs, the only effective way of ridding the building of bats is to block all entrances that a bat can use. This must be done when no bats are in the roost or they will be trapped inside and die. In Idaho, winter is the best time to do this because bats leave buildings to return to their hibernacula. Entrances can be blocked in summer by waiting until bats leave in the evening, but if the colony is a maternity colony this cannot be done before all the young are flying or the young will be trapped inside the building to die. If you have a concern about bats roosting in your home or cabin, contact your local Fish and Game biologist for more information.

Few human health concerns are associated with bats, but rabies is one of them. Bats, like all mammals, can contract and transmit the rabies virus. There is no evidence that the disease occurs at a higher rate in bats than in mammals such as foxes,

Continued after next page

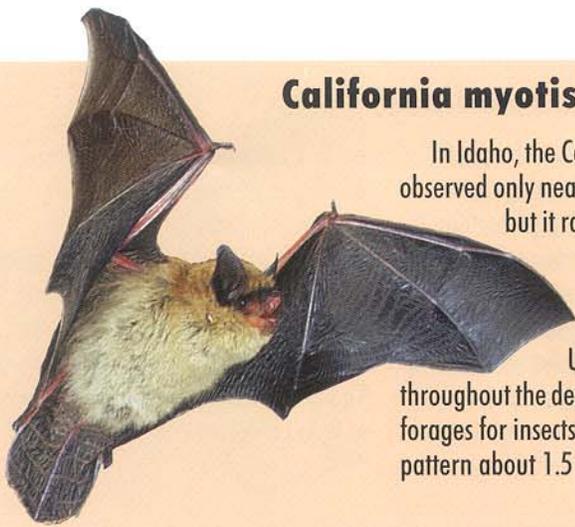
MINE SAFETY AND CAVE MANAGEMENT



DAVID KESNER

Bats often roost in abandoned mines, but entering them risks disturbing them and harming yourself. Federal regulators forbid entry of underground workings in excess of 25 feet.

Natural caves also pose hazards to humans. It's unwise to explore them alone or without experienced cavers as guides. A few caves and mines in Idaho have been gated. Please respect these gates; they are there to protect you and the environment.



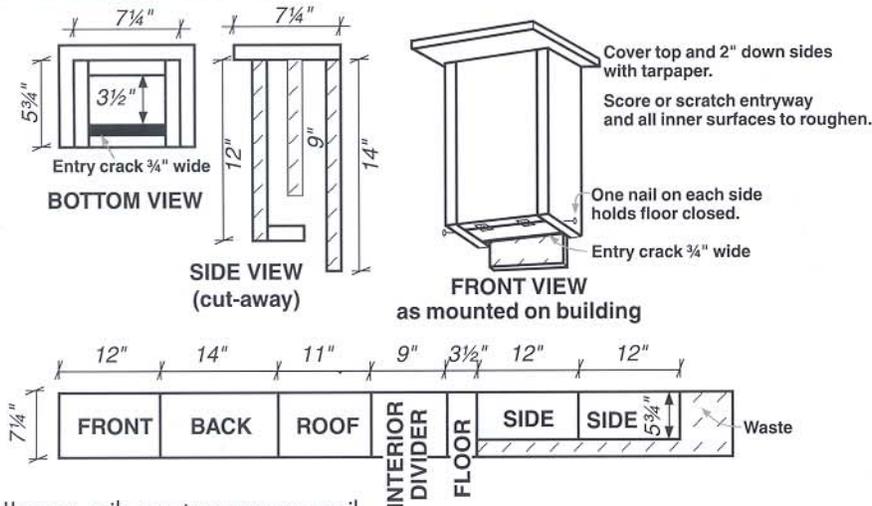
California myotis (*Myotis californicus*)

In Idaho, the California myotis has been observed only near our west-central border, but it ranges in lowlands from extreme southern Alaska and western Canada south into Montana, Utah and California and throughout the desert Southwest. This bat forages for insects in a slow, erratic flight pattern about 1.5 to 9 feet above the

ground. It appears to coexist with western small-footed myotis by spatially partitioning food sources. Night roosts are often human-built structures and day roosts are various crevices. One pup per female is born in late May to mid-June. Nursery colonies number up to about 25 individuals.

BATS IN THE NEIGHBORHOOD

HOW TO MAKE A BAT HOUSE



Tools: Hammer, nails, saw, tape measure, pencil

Material: 3/4" rough-sawn cedar or other untreated wood. If rough wood is unavailable, cut 1/16"-deep saw kerfs every 1 1/2" on interior surfaces so bats can grip them.

Partition spacing: Minimum 3/4"; maximum 1 1/2"

Finish: The ideal interior temperature for females roosting with young is 80 F to 100 F, slightly cooler for nonmaternity colonies. To warm the bat house, cover the top and 2" down sides with tarpaper, or paint the roof dark brown; to cool it, use light paint. Roughen all inner surfaces by scoring.

Placement: Hang the bat house 12 to 15 feet above ground on a tree or building within a quarter-mile of a stream or pond, where bats can find insects. Face it southeast or west, to receive 6 to 8 hours of sunlight a day and to get as much morning sun as possible. Shelter the bat house from wind.

To hang it, drill two 1/4-inch holes in the back, centered horizontally, one 4 inches from the top and one 4 inches from the bottom. Drive two stout nails into the mounting site as far apart as the holes on the back of the house. Hang the house on the nails.

Place your house by early April. It may take several years to be discovered; chances of occupancy are better if bats already live nearby. To increase chances of bat habitation, use building material from an old barn or shed where bats once lived. The house need not be cleaned after use.

This house offers a haven for several bats. To order free plans for a larger, colony-size house, contact Editor, *Idaho Wildlife*,

208-334-3746 or P.O. Box 25, Boise, ID 83707-0025.

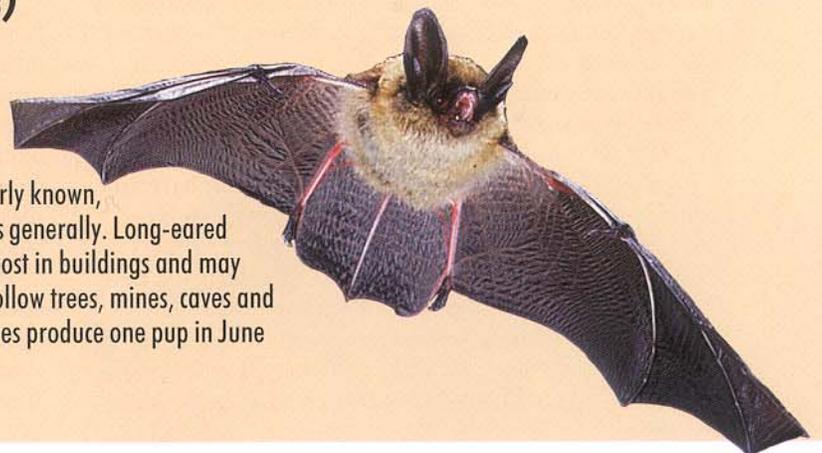
Another idea: Bat Conservation International recently reported that tree-dwelling bats in Canada use shelters made by tacking tarpaper to a tree and covering it with shingles angled to provide roosting space beneath them. The same principle works in Idaho: A colony of bats reportedly makes its home under shingles covering a geodesic dome near Sweet.

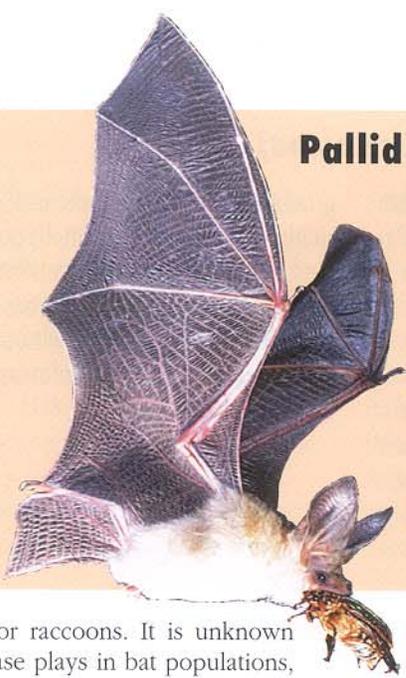
(Plan courtesy Minnesota Dept. of Natural Resources Nongame Program)

Long-eared myotis (*Myotis evotis*)

This forest-dwelling bat forages over water or among trees by picking prey from the surface of foliage, tree trunks, rocks or the ground. It may fly slowly around a shrub searching for emerging moths. Although widespread from central British Columbia south to Baja California at elevations from near sea level along the Pacific Coast to about 8,600 feet in Wyoming, its distribution

in Idaho is poorly known, as are its habits generally. Long-eared myotis often roost in buildings and may also roost in hollow trees, mines, caves and fissures. Females produce one pup in June or July.





Pallid bat (*Antrozous pallidus*)

This pale, large, gregarious bat usually forms clusters in day roosts in rock crevices or buildings, less often in a cave, tree hollow or mine. Emerging relatively late in the evening, it captures prey on the ground after an aerial search. It also takes prey in flight a few feet above ground vegetation. Food includes flightless arthropods, Jerusalem crickets, moths,

beetles and small vertebrates. Pups, usually twins, are born from May through June in maternity colonies that are generally small, but may include more than 200 adults. In west-central and southern Idaho, pallid bats are found in rocky river canyons and cliffs near water. The species ranges from British Columbia to Baja California and central Mexico.

skunks, or raccoons. It is unknown what role this disease plays in bat populations, but it is believed to be minimal because the occurrence of rabies in natural populations appears to be low.

Rabies is transmitted when saliva or nervous tissue of an infected animal comes in contact with an open wound or mucus membrane (eyes, nose, mouth) of another mammal. There is one documented case in which rabies is thought to have been transmitted through the air, but that was in a poorly ventilated cave containing millions of bats. Idaho has no such caves.

Rabies is always fatal to mammals unless it is detected and treated before symptoms appear. Some rabid animals become violent and aggressive before dying. Others, including bats, become passive and suffer paralysis before dying. We all have been told many times to never handle a sick or aggressive animal, but many people may not recognize that a passive animal also is cause for concern. The rule of thumb is *never handle any wild animal*.

If you must handle a bat, such as to remove one from your house, use heavy gloves, a towel or other heavy material. If you or your pet is bitten by a bat or any mammal, including a neighbor's pet, you should be concerned and call your physician.

IMPORTANCE OF BATS

Bats serve many vital functions in the ecosystems to which they belong. Particularly important are their interactions with plant communities in many parts of the world.

In tropical areas, fruit-eating bats are responsible for dispersing the seeds of many different plant species. Therefore, they play an important role in reforesting either naturally disturbed or logged areas. Nectar- and pollen-feeding bats are important pollinators of night-blooming flowers in desert and tropical ecosystems.

Bats prey on many animals, most notably insects. They are the main consumer of nocturnal insects. As noted above, individual bats consume a large number of insects. Where bats form large colonies, as they often do, they can have an important impact on insect populations, providing an economic benefit to agricultural and forestry industries. Insect infestations can be controlled by bats, thus reducing the need for expensive and sometimes toxic chemical pesticides.

Because all of Idaho's bats are insectivorous, they help keep forests healthy and remove pests from agricultural crops. They even help control mosquitos in residential areas. An increasing number of people are trying to encourage bats to

form colonies near their homes by installing bat boxes (see how to build one on the previous page). When colonies are established, they provide not only a natural insect control but also the enjoyment of watching the bats in their evening emergence and foraging flights.

Another role bats play in natural communities is that of prey. Bats are food items for many other organisms, including owls, snakes and raccoons.

Bats also affect cave ecosystems. They bring nutrients and energy into a system that cannot produce its own. Bat droppings (guano) provide energy that benefits cave-dwelling organisms such as insects, small mammals and fish. Guano also provides nutrients at roost locations other than caves, and has even been mined for use as fertilizer.

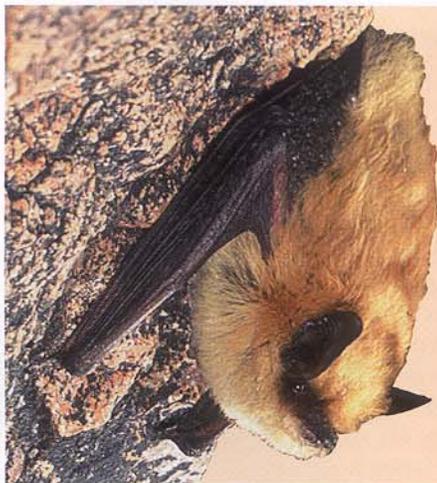
Bats' many unique characteristics have benefitted humans in many fields of research. Their sonar systems and ability to become torpid in order to withstand low temperatures are just two examples of characteristics that have increased our knowledge and led to new technology.

CONCERNS AND CONSERVATION

In spite of the many benefits bats provide to natural ecosystems and humans, they continue to be at risk because they are misunderstood and feared. Bat populations are declining worldwide. Several species have become extinct and many others are threatened with extinction, including several North American species. In Idaho, the Idaho Department of Fish and Game currently has classified four bat species as "Species of Special Concern." This classification prohibits the taking or possession of these species.

This decline in bat populations is due to a combination of factors that must be addressed to conserve bat populations, including bat eradication programs, vandalism, disturbance caused by recreational caving, destruction and degradation of roosting and foraging habitat, human consumption and pesticide use. When bats are considered a health concern or feared due to myth or superstition, people still destroy roost sites and kill bats. Education and stronger protective laws would help stop these senseless practices.

Bats' roosting habits make them very vulnerable to disturbance and vandalism. They roost in groups, often in the open, making them easy to detect. When disturbed, they take at least several minutes to arouse from torpor, so people can approach them before they can fly. Large numbers of bats have been killed by vandals simply because they could not



Western small-footed myotis (*Myotis ciliolabrum*)

One of the last bats to begin hibernation, this species winters in lava-tube caves in southern Idaho. In summer, it roosts in rock crevices, under boulders, beneath loose bark and in buildings in arid habitat. This bat's diet probably consists of various small insects found while foraging along cliffs and rocky slopes in the middle of the night. Western small-footed myotis range from southwestern Canada through the

western U.S. into Mexico. Little information is available on reproduction, but pregnant and lactating females have been reported from late May through early July in small maternity colonies. Hoary bats are known to prey on this little bat with its tiny foot, only a third of an inch long.

escape. Even responsible recreational caving can disturb roosting bats and harm their population. As a result, many landowners and land management agencies are closing bat roost sites to human use while bats are there. Occasionally, gates are installed to keep people out. When this is done, they must be designed to allow bats easy in-flight access.

Abandoned mine closures are of special concern because they are being conducted at an increasing rate throughout the western United States and often without any biological survey. If abandoned mines are identified as important bat roosts, they can be "closed" with gates that allow bats access but eliminate danger to humans.

Sometimes, even research and education can affect bat populations. Therefore, these activities should always be done in a well-thought-out manner by qualified individuals. In spite of the potential threats, research, monitoring and education are essential to protecting bats.

In sum, the keys to bat conservation worldwide as well as in Idaho are to

- 1) foster an appreciation of the importance of bats to humans and natural communities through education,
- 2) increase our knowledge about bat requirements and interactions with the environment through research and monitoring, and
- 3) protect important bat foraging and roosting habitat by encouraging land managers, landowners, recreationists and other land users to be mindful of our obligation to conserve this unique and important piece of the ecosystem puzzle.

BATS IN YOUR BELFRY?

HERE'S HOW TO REMOVE THEM

If the colony is small, it is usually wise to leave it undisturbed, letting the bats earn their keep by helping reduce local bug populations. Unlike mice or rats, bats do not chew holes in woodwork or seek human food, and will only enter the interior of an occupied home by mistake.

Since most species form only temporary seasonal colonies, to control guano accumulations in an attic simply place plastic sheeting under the roost. You can remove it when they leave for the season. (Guano makes excellent fertilizer.)

If you need to remove the bats, don't hire an exterminator. It's much safer and cheaper to simply watch bats in the evening. When they leave, plug the access holes so they cannot return. (A side benefit of batproofing is energy conservation.) To succeed, you must plan the eviction during good weather so all bats will be out feeding. Don't try this between late May and mid-July when young are being reared; offspring are usually left behind in the roost while adults are out feeding. The ideal time to batproof is in fall, after the bats have left for the winter.

To keep bats in the neighborhood after you evict them, place a new bat house in your yard or near their old roost before you dislocate them.

For further help in dealing with bats in undesirable locations, call your local Idaho Department of Fish and Game biologist.

Spotted bat (*Euderma maculatum*)

One of the few bats whose echolocation calls are audible to humans, this bat has been observed in Owyhee County canyons. Spotted bats roost alone but may hibernate in small clusters; their winter habits and range are little known. They appear to maintain exclusive foraging areas 3 to 6 miles from their day roost, flying continuously from about 49 minutes after sunset to an hour before sunrise to feed primarily on

noctuid moths and sometimes beetles. Females produce 1 pup in late May or early June in the species' southern range (southwestern U.S. to central Mexico). Spotted bats occur as far north as southern British Columbia and east to Texas' Big Bend region.



WHERE TO SEE BATS

IDAHO'S BATTIEST STATE PARK



THEODORE WHITMOYER/HARRIMAN STATE PARK

Harriman State Park is well known for offering world-class angling on the Henry's Fork of the Snake River, scenic vistas of the Grand Teton range and opportunities to see rare trumpeter swans. Perhaps less famous but equally interesting to visitors is another wildlife species resident during the summer months: thousands of little brown bats (*Myotis lucifugus*). In the evening at dusk, they emerge from cracks and crevices in the old Railroad Ranch buildings. Just as it's dark enough to see shadows in the night, swarms of bats silently whirl from the wooden cabins and barns. This unique watchable wildlife opportunity is easily accessible to park visitors.

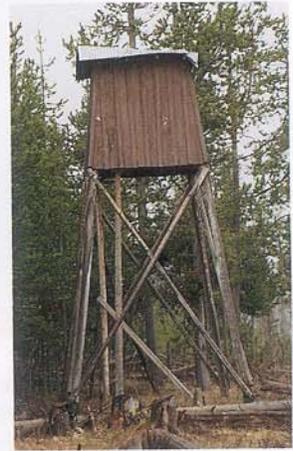
When railroad magnate Edward H. Harriman established Railroad Ranch in the early 1900s, little brown bats found the

ranch buildings to be comfortable roosts. They moved in immediately and a population has made the ranch its home to this day.

Early ranch managers didn't recognize the benefits of their bat neighbors. Over the years, many bat eviction efforts began...and failed. Ranch managers tried everything from chemicals and mothballs to loudly playing a recording of "Cascade of the Roses Waltz." In 1957, a manager who realized that bats were beneficial constructed a house just for them. He lined it with bat guano (bat droppings), hoping to lure residents out of the ranch buildings. Unfortunately the edifice, about 6 feet by 8 feet and mounted on 20-foot stilts, never did attract any bats.

Every summer, bats migrate to Harriman State Park for its comfortable roosting areas and the abundance of their favorite food, mosquitoes. Containing two lakes, eight miles of the Henry's Fork of the Snake River and numerous meltwater ponds, marshes and springs, Harriman State Park is a perfect breeding ground for the insects, which provide an endless bat smorgasbord.

By mid- to late May, the bats have returned to their roosting places and are getting ready to have their young in June. Each female rears one pup per year, which is ready to fly in July, three weeks after birth.



THEODORE WHITMOYER/HARRIMAN STATE PARK

Little brown bats (left) make their summer home at Harriman State Park in unoccupied ranch buildings. Efforts to lure them into other roosts (above, built in 1957, below in 1993) have met with limited success.



THEODORE WHITMOYER/HARRIMAN STATE PARK

Little brown myotis (*Myotis lucifugus*)



DR. J. SCOTT ALTENBACH

The most common, most studied bat in North America, little brown bats consume flying insects, especially mosquitoes and midges, which they knock from the air with a wingtip, capture in their interfemoral membrane and lift to their mouth. They forage through woodlands near water two to three hours after

sunset and after a midnight roost. Caves, hollow trees and structures are rearing and roosting sites. Hibernating bats need a constant temperature of about 40 F and relative humidity near 80 percent. Tens of thousands winter together; summer colonies number 50 to 2,500. One pup per female is born. This species occurs from Alaskan and Canadian boreal forests south to central Mexico, except for the southern Great Plains.

FURTHER READING

Barbour, R.W. and W.H. Davis, 1969. Bats of America. University of Kentucky Press.

Bonnell, M.L. 1967. Emergence and foraging behavior in small populations of Idaho bats. M.S. Thesis, University of Idaho, Moscow.

Bosworth, W.R. 1994. Characteristics of winter activity in *Plecotus townsendii* in southeastern Idaho. M.S. Thesis, Idaho State University.

Doering, R.W. 1996. Thermal implications of roost site selection in hibernating *Plecotus townsendii*. M.S. Thesis, Idaho State University.

Fenton, M.B. 1992. Bats. Facts on File, New York.

Findley, J.S. 1993. Bats: a community perspective. Cambridge University Press.

Gahl, J. 1986. Bats are beautiful! Idaho Wildlife, Vol. 6 No. 5.

Genter, D.L. 1987. Dolphins of the sky. Idaho Wildlife, Vol. 7, No. 4.

Groves, C. 1996. Annotated atlas of Idaho's terrestrial vertebrates. Idaho Department of Fish and Game, Conservation Data Center, Boise.

Hill, J.E. and J.D. Smith 1984. Bats: A natural history. University of Texas Press, Austin.

Keller, B. 1987. In search of a rare Idaho bat. Idaho Wildlife, Vol. 7 No. 4.

Keller, B. 1985. A simplified key for Idaho bats. *Tebiwa* 22:57-63.

Kunz, T.H. 1988. Ecological and behavioral methods for the study of bats. Smithsonian Institution Press, Washington, D.C.

Kunz, T.H. in press. A guide to bats of North America. Oxford University Press, New York.

Nowak, R.M. 1994. Walker's bats of the world. Johns Hopkins Press, Baltimore.

Tuttle, M.D. 1988. America's neighborhood bats. University of Texas Press, Austin.

Wackenhut, M.C. 1990. Bat species over-wintering in lava-tube caves in Lincoln, Gooding, Blaine, Bingham and Butte counties, Idaho, with special reference to annual return of banded *Plecotus townsendii*. M.S. Thesis, Idaho State University.

CHILDREN'S BOOKS

Bash, B. 1993. Shadows in the night, the hidden world of the little brown bat. Sierra Club Books for Children, San Francisco

Cannon, J. 1993. Stلالuna. Harcourt, Brace Jovanovich, New York.

Cooper, A.C. 1994. Bats, swift shadows in the twilight. Denver Museum of Natural History, Denver.

Collar, A. 1992. The bat in my pocket. Capra Press, Santa Barbara

Makool, A. 1983. Batty's up: a story about bats for children of all ages. Central Wisconsin Printing, Necedah, 20 pp.

Milton, J. 1993. Bats! Creatures of the night. Grossett and Dunlap, New York.

ZooBooks. 1989. Bats. Wildlife Education, Ltd., San Diego. (List from *Bats of Colorado: Shadows in the Night*, 1994)

RESOURCES

Project WILD, Idaho Department of Fish and Game, Box 25, Boise, ID 83707-0025; 208-334-2633.

Nongame and Watchable Wildlife Program, Idaho Department of Fish and Game, Box 25, Boise ID 83707-0025; 208-334-2920.

Bat Conservation International, P.O. Box 162603, Austin TX 78716.

Western States Bat Working Group, c/o Lyle Lewis, Bureau of Land Management, 2620 Kimberly Road, Twin Falls ID 83301; 208-736-2368.

Idaho Bat Working Group, c/o Martha Wackenhut, Idaho Department of Fish and Game, 1515 Lincoln Road, Idaho Falls ID 83401; 208-525-7290.

Harriman State Park, HC 66, Box 500, Island Park ID 83429; 208-558-7368.

Gem State Grotto c/o Peggy and David Kesner, 12567 W. DeMeyer, Boise ID 83713-1409; 208-939-0979.

PUBLICATION CREDITS

Writers: Martha Wackenhut (Idaho Department of Fish and Game); Mary McGraw (Harriman State Park)

Editor: Diane Ronayne (Idaho Department of Fish and Game)

Designer: Claudia Hon (Omni Studio, Boise)

Reviewers: John Gahl, Chuck Harris (Idaho Department of Fish and Game); Paula Perletti, Lyle Lewis (Bureau of Land Management)

Photographers: Jim Oltersdorf (cover), Dr. J. Scott Altenbach (species descriptions), Merlin Tuttle/Bat Conservation International (research, food, bat watching sidebars), David Kesner (mine safety sidebar), Theodore Whitmoyer/Harriman State Park, Diane Ronayne/IDFG (Where to See Bats sidebar).

Funding: Idaho Project WILD, Idaho State Parks and Recreation, IDFG Nongame and Watchable Wildlife Program, U.S. Bureau of Land Management.

Cost: Costs associated with this publication are available from IDFG in accordance with IC Sec. 60-202.HB366:12-92.

Second Publication: Fall 1998

This publication was produced to inform the public about the importance of Idaho's bats, which are nongame species. Donations to the Nongame and Watchable Wildlife Program made to the IDFG Nongame Trust Fund, P.O. Box 25, Boise, ID 83707, are tax deductible to the extent allowed by law. Purchase of an Idaho wildlife license plate provides \$10 to this program.

SHOW YOU CARE
Order a **WILDLIFE** license plate.



Available at
your local
vehicle registration.

Proceeds go to IDFG
Nongame and Watchable
Wildlife Program.

