ARIZONA BAT CONSERVATION STRATEGIC PLAN

Arizona Bat Resource Group

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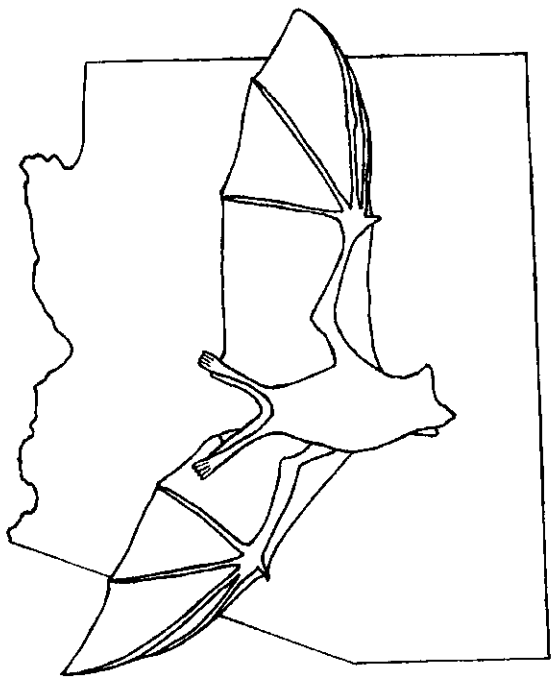

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FORAGING HABITAT

Foraging habitat requirements may vary greatly among species and even, seasonally and spatially, within species. For insectivorous bats, prey availability may change considerably between seasons or habitat types. The amount of selectivity of foraging bats for prey type may differ among species, although this is poorly understood. To fully understand the importance of different types of foraging habitats for insectivorous bats, we must understand the relationship between the bat and the species that it preys on, as well as the relationship between the prey and its habitat.

Although bats may travel long distances between roosting and foraging sites, proximity to appropriate roosts may influence the suitability of a particular area for bat foraging. The availability of night roosts near a foraging area may increase bat usage.

The appeal of a particular area may also depend on the predictability of the resource base. This can vary widely depending on the nature of the resource base. Some areas, especially riparian areas and agricultural fields, may have predictably large populations of certain insects, whereas other areas may have more ephemeral populations. Nectar-feeding bats may have an advantage in this respect, as their resource base is immobile. Large patches of flowering plants constitute reliable foraging areas that may be utilized night after night throughout and, to some extent, between seasons.

Availability of water for drinking may be of importance to bats when selecting foraging habitat. Although some species of bats (i.e. Yuma myotis) usually occur near open water, many species are found in arid areas without any surface water.

Bats may also be susceptible to predation and disturbance when foraging, so choice of foraging area may depend on some amount of protection from these threats. Frequently, insectivorous bats forage near forest edges, which, aside from supplying insect prey, may provide shelter from predators or weather. Some areas that may be rich in insects, especially in urban settings, may not be suitable foraging habitat due to noise, lights, or disturbance from humans. However, some bats regularly forage for insects around lights.

Threats. -- Both insectivorous and nectarivorous bats may be quite loyal to foraging areas, returning to the same site year after year (Brigham 1991; K. Hinman, personal communication; P. Brown, personal communication). Alterations of these sites may have large impacts on the bats that rely on them. Such alterations could include, but are certainly not limited to, logging, grazing, fire, and urbanization. Pesticide use and pollution of foraging sites may also negatively affect bats foraging in particular areas. Grazing in areas visited by nectarivorous bats may deplete populations of forage plants.

Unfortunately, lack of knowledge about the requirements of bats in terms of foraging areas severely hampers efforts to manage for these areas. More research is needed to determine what constitutes good foraging habitat for different species of bats. Researchers and managers should take a landscape level approach that incorporates roosts, foraging habitat, and other resources into management planning and conservation initiatives.

WATER AVAILABILITY / IMPORTANCE

In addition to roosts and foraging habitat, water is another integral component of bat habitat. Not only is free water important for drinking, the presence of water generally increases associated vegetational and structural diversity, and many species of wildlife, including bats, may use these habitats disproportionately more than others. Water may also provide important foraging habitat, and waterways may constitute good flyways.

While many species of bats are reliant on open water for drinking, some desert species roost 25 or more miles (≥40 km) from any open water. In telemetry studies of California leaf-nosed bats, Brown (personal communication) found that these bats would bypass open water and spend all their flight time gleaning desert wash vegetation. While at times they have been captured over water, California leaf-nosed bats, Townsend's big-eared bats, western pipistrelles, pallid bats, and California myotis regularly occur in areas with no surface water (although sometimes springs choked with vegetation are in the vicinity). When water is available, these species will drink, but it appears that surface water may not be essential to the survival of some desert bats (P. Brown, personal communication). For nectar-feeding species such as lesser long-nosed bats and Mexican long-tongued bats, whose diet is mostly liquid, free water for drinking also does not appear to be important.

The presence and juxtaposition of each of the 3 major habitat components, roosting habitat, foraging habitat and water, may influence, or be influenced by, the others. For instance, bat roosts may often be found near water sources, and water sources may also influence the quality of bat foraging habitat or roost selection.

Bats use a variety of water sources. These include ponds, lakes, and reservoirs, streams and rivers, livestock tanks, wildlife drinkers, springs, and probably any other source of open water to which bats can gain access.

The usefulness of a water source to bats often depends on the type of source, its accessibility, reliability, location on the landscape, and the vegetation or other features that may be growing in or around it. Because bats drink while on the wing, scooping water up with their lower jaws or tongue, accessibility is determined both by the water sources' freedom from obstructions, such as fencing or vegetation, and the flight characteristics of the particular species of bat. Still or slow-flowing water is likely to be more usable to bats than faster-flowing water (Von Frenckell and Barclay 1987). Bats that exhibit the greatest degree of maneuverable flight can probably be expected to exhibit the greatest variety in access to and use of water resources, whereas bats with less maneuverable flight can be expected to be more limited in the water resources that are available to them (Altringham 1996). For instance, the fringed myotis, which is particularly agile in flight, could be expected to use water resources of a wide range of sizes and accessibility, while the big free-tailed bat, a larger and less agile bat, may be limited to more open water with less surrounding vegetation or other features that affect its flight path. Even if the water is generally open or otherwise accessible to bats, factors such as emergent or surrounding vegetation could influence the ultimate value of the water source; too much surrounding vegetation will restrict access to only the most maneuverable bat species. However, the presence of some vegetation around water may provide some protection from predators and can improve

foraging conditions by blocking wind, while emergent vegetation may also provide substrate for insect prey.

The exact distribution and density of water resources on the landscape necessary to sustain bat populations is largely unknown. In addition, as noted above, water needs of bats are likely to vary according to the species, the season of the year, and the condition of individuals. For instance, reproductive females exhibit higher water needs than non-reproductive bats of the same species, and it is generally thought that maternity roosts of most species need to be in close proximity to a reliable water source.

Water also can be used as foraging habitat, and several bat species appear to forage preferentially over both still and moving water. Big brown bats, silver-haired bats, Arizona myotis, and Yuma myotis all forage over slow moving water. Yuma myotis can be very abundant foraging over lakes and ponds in some areas during summer. During insect hatches, other species will forage over water as well.

Threats. -- The recreational and economic values of water and its associated habitats can put bats at substantial risk of human disturbance.

When designing, implementing, or modifying water improvements for livestock and wildlife, land managers can improve their usefulness to bats by insuring that the free water is available to as many species as possible. This can be done inexpensively by eliminating, modifying, or reducing obstructions such as fencing, plumbing, and covers. Although there is ample evidence that overgrazing by cattle and wildlife can affect the long-term availability of water to bats, in some cases, the elimination of all grazing at a particular site can allow recovering riparian vegetation to completely block bat access. These trade-offs should be considered in the context of the availability to bats of alternate water sources and other habitat features when managing livestock and wildlife.

Bats that concentrate their activities around polluted water are at risk of being affected, either directly or indirectly, by contaminants (Clark and others 1983). Species that rely heavily on aquatic insect prey may be adversely affected by disturbances, such as pollution or siltation, that alter prey abundance (Tuttle 1979).