ECOLOGICALLY SENSITIVE MANAGEMENT OPTIONS FOR BATS

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INTRODUCTION

Over the past decade, there has been a dramatic, positive shift in the public image of bats in the United States (Tuttle 1988a). This shift is particularly impressive in light of the inappropriate and poor public image that bats have suffered in most western nations in the last century. Over the past decade, a sizeable segment of the U.S. public, as well as local, state and national officials, have been educated to the ecological and economic value of bats which results from their insectivory and plant pollination activities (Olkowski and Olkowski 1989, Tuttle 1988b). The fact that they pose a low risk to public health (Constantine 1988, Tuttle and Kern 1981) is also becoming more widely known and accepted. It seems likely that within a short time bats may become as popular a form of wildlife in the U.S. as they now are in England and Germany (Mitchell-Jones et al. 1986). Research and the results of a variety of control procedures have demonstrated that exclusion is the only safe, efficient, and effective long term technique for dealing with bats in human occupied structures (Barclay, et al. 1980, Brigham and Fenton 1987, Corrigan and Bennett 1982, Greenhall 1982, Tuttle 1988b). This combination of new information, attitudes, and exclusion results compel those involved in the management of bats to use education as the primary technique in resolving human and bat conflicts. When management is warranted, physical exclusion techniques carried out in a manner sensitive to the ecology and preservation of bats should be the only solutions considered.

SYNOPSIS

Distribution and Ecology

Of the 40 U.S. species only 7 are normally encountered in human structures and the vast majority of cases involve only three species, the Little brown bat (Myotis lucifugus), the Big brown bat (Eptesicus fuscus), and the Mexican free-tailed bat (Tadarida brasiliensis). These three species are colonial. The Little brown is common in the northeastern U.S., the Big brown is widely distributed, and the Mexican free-tailed bat is common in the southwest from Texas to California. The other four species are solitary and roost in trees, and are less frequently encountered (see Tuttle 1988 or Greenhall 1982 for species descriptions, habits and detailed distributions of the common U.S. species).

Colonial species have a single young each year which is one reason that bat colonies grow slowly. When colony size increases rapidly it is due to immigration from another colony. Birth occurs in the spring with the exact timing varying with latitude; earliest in the south and occurring progressively later to the north. Weaning occurs approximately 45 days following birth, normally no later than early August in the most northern locales. Inexperienced, fledgling bats are more apt to wander into human living spaces or become stranded in some other conspicuous spot.

Big brown and little brown bats usually hibernate in caves or mines but use buildings for that purpose on occasion. Most Mexican free-tailed bats migrate into Mexico during the fall but small colonies may be present year round in the extreme southwest. In moving between hibernation sites and summer roosts bats often use temporary quarters from a few days to a few weeks. These temporary roosts are sometimes more conspicuous than their other roosts and, as a consequence, reports of bats in dwellings often peak in the fall and spring.

Bats leave their summer roost each evening and feed for several hours.

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They may return to their roost immediately or rest in a temporary roost, feed again, and then make their return. Bats eat hundreds to thousands of insects each evening, consuming 50% or more of their weight daily. Even though individual bats are relatively small, a colony of several hundred will consume hundreds of pounds of insects in a year, and very large colonies, such as those of Mexican free-tails, consume tens of thousands of pounds of insects each evening (Tuttle 1988a). Bats often feed opportunistically and many of the species they eat are super abundant crop pests. From an ecological view point, bats play an invaluable role in the balance of nature (see Hill and Smith 1984 for a thorough account of bat ecology and behavior).

Human Health Concerns

Rabies and histoplasmosis are the two most important health concerns associated with bats (Constantine 1988). The latter is a fungal infection of the lungs which is contracted by the inhalation of spores when dust containing bat or bird guano is stirred up (Hoff and Bigler 1981). Infection rates are greatest in the midwestern U.S. where over 80% of the human population may show antibodies. Most cases of histoplasmosis are asymptomatic. Active cases are characterized by flu-like symptoms which may persist for several weeks and severity of the infection is dose dependent. Exposure can be avoided by fine pore face masks which are well fitted.

Human deaths from bat transmitted rabies over the last forty years in the U.S. and Canada combined number less than 20 (Tuttle and Kern 1981). This surprisingly low number is due to the following set of circumstances. First, the incidence of rabies in bat populations is low, normally less than 1/1000 (Constantine 1988). The high percentages sometimes reported by health agencies occur because the particular individuals submitted for testing are a biased sample made up of rabies suspect individuals. Any bat found dead or unable to fly is much more likely to test positive for rabies than an active individual captured in a colony.

Rabies biased natural groups may develop when sick bats that are unable to fly collect at roosts during migration. Samples from such groups yield deceptively high rabies infection rates. Over the U.S., the percentage of rabid bats is fairly constant between years, and the available data indicates that rabies in bat populations is not epidemic.

Contrary to earlier reports, bats do not act as asymptomatic carriers of rabies, i.e., infected bats exhibit a consistent pattern of disease progression, including an infectious period followed by paralysis and death (Constantine 1988). Immunological studies indicate that some bats do survive rabies but they become noninfectious.

Transmission potential for many U.S. bats is low because their teeth are so small that it is difficult for them to break human skin. In addition, rabies is paralytic in bats and their mobility is greatly reduced during much of the time that they are infected. Colonial bat species have the greatest potential for human contact but they do not become aggressive as a result of the disease (Constantine 1988, Tuttle 1988b) and this also reduces transmission potential. The rare cases of aggressive, rabid bats is confined to incidents with solitary species. Transmission normally results from a puncture wound or contact between fresh, infected tissue and an open wound. Fortunately, the survival time of viruses outside of living cells is very short. Aerial transmission of rabies is restricted to the extraordinary circumstances where literally millions of bats inhabit a cave and the air is saturated with their exhalations. Rabies cannot be transmitted by urine or feces.

The transmission of bat rabies to domestic and wild animals is a human health concern (Kaplan, 1985) because both groups are often in close contact with humans. Even though dogs and

especially cats frequently find downed bats there has never been a demonstrated transmission of rabies to dogs or cats. Dogs, cats, and wild carnivores become aggressive when rabid, are large enough to inflict significant puncture wounds and, thus, have high transmission potential (Constantine 1988, Baer 1975 and citations therein). The role of bats in wildlife rabies has been redefined on the basis of new data which indicates that they rarely transmit rabies to wild carnivores and when they do it is a dead end transmission involving one or a few individuals, i.e., it does not cause an epidemic.

The ectoparasites of bats are specific to these animals but may occasionally become a nuisance in buildings after their hosts have been evicted from a large roost (Tuttle 1988b). Problems of this sort are short lived because of the host specificity of these parasites. Bat ectoparasites are not known to transmit diseases to humans.

Large concentrations of guano may cause odor problems, especially during warm, humid summer months. Other than decomposition, physical removal of the guano is the only solution but care should be exercised in areas where histoplasmosis occurs.

Ecologically Sensitive Solutions to Nuisance Problems

The only truly effective, long term solution to nuisance situations in buildings is structural exclusion. This is most easily accomplished in the fall or winter after the colony has left for its hibernaculum. If it is determined or suspected that the colony is hibernating in the structure, or immediate removal is mandatory, aviary netting or one-way funnels should be used for several days to exclude the colony. (The necessary materials and techniques are described by Constantine 1982, Frantz 1986, and Tuttle 1988). Repairs can then be made without trapping bats inside. These exclusion techniques should not be used during June or July unless it has been ascertained that babies are not present. It would be cruel to trap them inside and it is likely that a serious odor problem would be caused.

Pesticides such as Rozol (chlorophacinone) are not acceptable solutions for several reasons. They are often only partially effective and the colony may reconstitute itself quickly by immigration. Their use may defer the more preferable long term solution and may, in fact, create a public health problem far more serious than posed by the presence of the undisturbed bat colony in the structure (Constantine 1988, Tuttle 1987, 1988b). Poisons seldom kill all of the bats at a colony site (Kunz et al. 1977) and they often abandon the roost, spread out through the surrounding neighborhood and fall sick or dead to the ground where the potential for human and pet contact is high. In addition, toxicants used for bats may compromise, quite unnecessarily, the health of the human inhabitants. Moth balls and sonic devices have been used to discourage bats from using roosts but both have proven ineffective (Hurley and Fenton, 1980, Tuttle, 1988b).

The great ecological value of bats and the fact that they pose a low human health risk should encourage the use of an exclusion technique(s) that is effective in mitigating the nuisance over the long term but does not destroy the bats.

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