BIG BROWN BAT

Eptesicus fuscus Beauvois, 1796
(Vespertilionidae)

Global rank G5 (05Nov1996)
State rank SNA (03Nov2005)
State rank reasons
Probably only an accidental visitor to the state.

Taxonomy
Koopman (1989) included both *E. fuscus* and *E. lynni* in *E. serotinus*. Jones et al. (1992) used the name *E. fuscus* for this species. Koopman (in Wilson and Reeder 1993) and Simmons (in Wilson and Reeder 2005) listed *E. fuscus* and *E. serotinus* as separate species but noted that the two may be conspecific; Koopman and Simmons both included *E. lynni* in *E. fuscus*.

Subspecies *fuscus* and *pallidus* apparently intergrade in northwestern Texas (Jones and Manning 1990). The relationships of the genera *Eptesicus* and *Pipistrellus* are unclear; for several Old World species there is some uncertainty as to which is the appropriate genus; the species of *Eptesicus* that are chromosomally characterized by 2n=50 and FN=48 form a genetically homogeneous group, despite the included taxa coming from different continents (Hill and Harrison 1987, Morales et al. 1991). *E. fuscus* exhibits significant morphological variation across its range and is represented by 11 subspecies (Agosta 2002).

General description
One of the larger bats, with a broad head, broad nose and long, lax fur. Fur color varies from pale to dark brown and tends to be oily in texture. Flight membranes and ears are black. Ears just reach the nose when pushed forward; tragus is short and blunt. The calcar has a prominent keel. Skull is robust, with thick, heavy jaws, a flattened brain case and large teeth (Nagorsen and Brigham 1993).
Length (cm) 13
Weight (g) 18

Reproduction
Copulates in fall and intermittently throughout winter. In temperate regions, ovulation and fertilization delayed until after hibernation. Gestation lasts 2 months. Young are born May-July, with slight trend toward earlier parturition in lower latitudes (Barbour and Davis 1969); mostly late May to June in Texas (Schmidly 1991). Litter size is usually one in western North America, two in eastern North America and Cuba (Nagorsen and Bickman 1993). Lactation lasts 32-40 days; young fly at 4-5 weeks (Nagorsen and Bickman 1993). Males usually are sexually mature in first fall; not all females reproduce at end of first year. Nursery colony rarely numbers more than a few hundred (mostly 25-75 adults in the eastern U.S., NatureServe 2006).


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Ecology
Males most often solitary in summer, or may roost with females or in all-male colonies. Winter colonies rarely number more than a few hundred. Less gregarious in winter; usually solitary in crevice, sometimes in small groups. When young, flying males may join nursery groups to form large, late-summer colonies (Barbour and Davis 1969). Capable of living at least 20 years, although few actually attain this age. Preyed on by owls, snakes, raccoons, and house cats (NatureServe 2006).

Plays an important role in many ecosystems because of its widespread distribution and relatively high abundance. A major consumer of nocturnal insects, many of which are economically important pests; transfers significant amounts of nutrients in ecosystems as guano accumulated at roosts; this is especially important in cave communities (Agosta 2002).

Migration
Fairly sedentary. Probably remains within 50 km of birthplace (Barbour and Davis 1969),
but movement patterns for the species in general are poorly known. Rarely moves more than 80 km between summer and winter roosts, though there is evidence that some individuals in the Midwest migrate south for winter (NatureServe 2006).

Phenology
Hibernates/aestivates seasonally, nocturnal. Initial foraging period occurs within 5 hours after sunset; most activity within second hour after sunset; subsequently may retire to night roost. Flies less than 2 hours each night. In Alberta, both sexes exhibited daily torpor during the gestation, lactation, and postlactation periods; males were torpid more frequently and used deeper torpor than did reproductive females (Hamilton and Barclay 1994).

In temperate areas many do not appear at hibernacula until November (Barbour and Davis 1969). Apparently does not hibernate in Cuba; may become torpid on cool winter nights (Kurta and Baker 1990).

Food
Dependent upon flying insects for food; small beetles are the most common prey in many areas. Large size, powerful jaw muscles, and robust teeth allow predation on larger insects with tough exoskeletons (e.g., beetles; Hamilton and Barclay 1998).

Habitat
Breeding: Studies in North America have failed to show unique associations with specific habitats suggesting *E. fuscus* is a habitat generalist (Agosta 2002). Uses various wooded and semi-open habitats, including urban areas. Much more abundant in regions dominated by deciduous forest than in coniferous forest areas, but can occur in large numbers in some coniferous forests. Summer roosts generally are in buildings; also hollow trees, beneath sloughing bark, rock crevices, tunnels, and cliff swallow nests; prefers sites that do not get hot. Typically roosts in twilight part of cave. Historically, maternity colonies were probably housed exclusively in tree cavities; now they are primarily found in buildings (Agosta 2002). Maternity colonies form in attics, barns and tree cavities; often in rock crevices or dead ponderosa pines in western Canada; in deep crevices and holes in limestone caves in Puerto Rico (Anthony 1925). Evidence suggests that most adult females return to same maternity roost site in successive years (Kurta and Baker 1990). In Alberta, reproductive females selected warmer diurnal roost sites than did males and non-reproductive females (Hamilton and Barclay 1994). In British Columbia, inhabits arid grasslands and interior and coastal forests from sea level to 1,070 m (Nagorsen and Brigham 1993). See Vonhof and Barclay (1996) for information on characteristics of roost trees in British Columbia.

Non-breeding: Caves, mines, and especially buildings and other human-made structures are used for hibernation in many areas (e.g., see Whitaker and Gummer 1992). Prefers larger caves and mines with relatively high airflow; in buildings, may be correlated with heating that maintains temperatures above freezing (Agosta 2002). Hibernacula and winter ecology are poorly known in many coniferous forests (Hayes 2003).

Foraging: Hunts in a variety of habitats: over water, over forest canopies, along roads, in clearings, and in urban areas, often around street lights that attract insects (Nagorsen and Brigham 1993). May prefer foraging amongst tree foliage rather than above or below the forest canopy (Schmidly 1991). Distance from day roost to foraging area averages about 1-2 km (Brigham 1991).

Global range
Southern Canada (including all provinces bordering the U.S.) south to northern Colombia, northwestern Venezuela, and northern Brazil; all Mexican states except those of Yucatan Peninsula (in northern Mexico most prevalent in eastern and western Sierra Madre bordering arid midlands of Mexican Plateau); in and along central mountain chain in Central America; Greater Antilles; Bahamas; Dominica and Barbados in Lesser Antilles; perhaps Alaska (Honacki et al. 1982, Kurta and Baker 1990, Jones 1989, Koopman in Wilson and Reeder 1993).

State range
Only one specimen has been collected in central Alaska, near Big Delta and the crossing of Shaw Creek and the Richardson Highway (Reeder 1965); likely transported there by a vehicle on the Alaska Highway (Parker et al. 1997). Reports of this species in Southeast Alaska by Manville and Young (1965) and Barbour and Davis (1969)

have not been verified (Parker 1996, Parker et al. 1997). In British Columbia, species occurs at same latitude as Southeast Alaska; Parker (1996) and Parker et al. (1997) offer no explanation for its absence in Southeast Alaska, but suggest it is not a regular member of Alaska's fauna.

Global abundance
See Arita (1993) for information on population size in Mexico.

State abundance
Currently thought to be only an accidental visitor in Alaska (Reeder 1965, Parker et al. 1997).

Global trend
May be increasing in the northern part of its range because of the availability of buildings with heated attics as winter hibernacula (Whitaker and Gummer 2000 in Agosta 2002). See Arita (1993) for general information on conservation status in Mexico.

State trend
Unknown.

Global protection
Unknown.

State protection
Unknown.

Global threats
Habitat loss and fragmentation: Because *E. fuscus* appears to be a habitat generalist, readily uses human-made structures as roosts, and takes advantage of insect concentrations near lights, habitat is probably a less important conservation component than it is for other bats. However, current forestry practices may have a negative impact on tree-roosting bat species and foraging activity has been shown to decrease with increasing urbanization, possibly because of lower insect abundance (Agosta 2002).

Disturbances to roosts: Bats that roost in buildings are often perceived as a nuisance and are vulnerable to exclusion and eradication attempts (Pierson 1998, Agosta 2002).

Exposure to toxins: Big brown bats are vulnerable to the bodily accumulation of toxins (e.g., pesticides) because of their high trophic rank and longevity. Adverse effects of organochlorine pesticides (e.g., DDTs) on bats are well documented; pesticides can cause mortality, altered behavior, and can be transferred to nursing young. Although banned in the U.S., residues still persist in soils and accumulate in some bat populations. Pesticide exposure is likely an important cause of decline for some insectivorous bat populations (Agosta 2002).

State threats
As species is likely accidental to Alaska, threats are considered minimal.

Global research needs
The following biological research needs were identified by Agosta (2002): Research is needed to assess risks to reproduction and survival from pesticide exposure. Additional studies are needed to better understand roost selection by bats including both tree and building roosts. The level and effect of disturbance at roosts needs study, particularly in buildings that house maternity colonies. Studies that identify sources of population decline and important life-history requirements of abundant bats like *E. fuscus* could be useful in directing research for rare and endangered bat species.

Global inventory needs
Long-term monitoring should be initiated or continued; these programs should include the collection of demographic data suitable for risk assessment modeling (Agosta 2002). Of particular interest is the possibility that *E. fuscus* is expanding in the northern part of its range because of the availability of buildings with heated attics. A consequence of range expansion could be competition with other bat species (Agosta 2002).

State inventory needs
See Global inventory needs. Bat populations in Southeast Alaska should be inventoried where not already, to verify or refute the presence of this species.

Global conservation and management needs
Bat conservation has primarily focused on rare and endangered taxa, but the ecosystem role of species such as *E. fuscus* may vastly exceed the role of inherently rare or currently endangered species. Furthermore, widespread and abundant bats provide ample research opportunities from which we may be able to draw some general conclusions about bat conservation as a whole. *E. fuscus* readily roosts in buildings and artificial bat boxes, a practical means for ensuring their continued abundance (Agosta 2002)

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