

Social network analysis and the study of sociality in bats

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Many bat species are known for being gregarious, forming mixed- or single-sex social groups commonly referred to as colonies. The number of studies investigating sociality in bats is rapidly increasing, with studies ranging from basic descriptions of the number of males and females within social groups to studies using social network analysis. Studies of sociality in bats are taking increasingly diverse approaches to data collection, analysis and interpretation, leaving researchers with an array of perspectives on how to conduct future research. These perspectives are difficult to synthesize, but an integrated understanding of pioneering works in this field should help researchers build upon what is already known about sociality in bats and formulate new hypotheses. Herein we provide a review of methodologies used to measure social interactions, relationships, and structure in bats. We review assumptions, sources of bias, strengths, and limitations of these methods. We emphasize that while all of the reviewed methods are well suited for assessing social interactions and relationships, each method will impact analyses of social structure and should be considered carefully. We encourage further use of social network analysis as a framework for conceptualizing, designing, and analyzing studies of bat sociality. We do not advocate any single network analysis methodology, as network analysis is continually evolving and no one technique is well suited for all research questions. Instead, we recommend several specific network measures we believe are appropriate for different types of research questions and datasets and discuss the strengths and limitations of popular analyses.

Key words: Chiroptera, fission-fusion, social behavior, social structure, social organization

Late-Pleistocene phylogeography and demographic history of two evolutionary lineages of *Artibeus jamaicensis* (Chiroptera: Phyllostomidae) in Mexico

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The *Artibeus jamaicensis* complex is an important component of the mammal biological diversity of the New World. Although there are numerous studies on the taxonomy and phylogeny of the complex, group relationships are still debated. Previous studies hypothesised that this species originated in South America and later colonised the Antilles Islands either through a northward migration or an eastward migration via Middle America. However, these studies do not include populations from Middle America west of the Yucatan Peninsula, making it difficult to obtain a clear description of the role of these populations in the evolutionary history of the species. In this study, we describe the phylogeography and demographic history of *A. jamaicensis* populations from Middle America west of the Yucatan Peninsula using cytochrome-*b* (612 bp) and D-loop (391 bp) mtDNA markers. Our phylogenetic analyses (maximum likelihood and Bayesian inference) did not recover clades corresponding to the previously recognised Middle American subspecies (*A. j. triomylus* and *A. j. yucatanicus*); rather, two haplogroups were observed, which showed extensive genetic diversity and strong genetic structure akin to that expected for a Middle American origin for the island populations. Bayesian skyline plots and mismatch distributions revealed that such haplogroups experienced a recent population expansion, which most likely took place in the late Pleistocene (100,000–216,000 BP). These estimates agree with earlier hypotheses that suggested a recent evolutionary history for *A. jamaicensis*, with hypotheses that suggested the existence of two different lineages migrating northwest from South America to Middle America, and with the possible colonisation of the Antilles Islands derived from both Yucatan Peninsula and northern South America.

Key words: *Artibeus jamaicensis*, evolutionary history, demography, cytochrome-*b*, D-loop

Population genetics and bat rabies: a case study of *Eptesicus serotinus* in Poland

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The serotine bat, *Eptesicus serotinus* is the most frequently rabies-infected (European bat lyssavirus 1-type, EBLV-1) bat species in Europe. To confirm *Lyssavirus* infection of this bat in Poland, we tested for the presence of rabies virus RNA from oropharyngeal swabs using RT-PCR. There was a 0.9% (two out of 212 individuals) level of infection within the overall population of serotine bats studied. However, an appreciation of the potential for pathogen transmission and disease risk requires an understanding of the dispersal of the primary host, and any large-scale geographic barriers that may impede gene flow. Thus, we also studied the patterns of bat dispersal via population genetics using nuclear (seven microsatellite loci) and mitochondrial (mtDNA control region) markers, examined in 12 subpopulations distributed across the country. Molecular analyses of microsatellite loci indicated high genetic diversity at all sites (heterozygosity observed, $H_O = 0.53–0.78$), and extremely weak genetic structure in the Polish population of the species. The overall F_{ST} was 0.012 (95% confidence interval: 0.006–0.020), and pairwise values ranged from 0.00 to 0.05. Only 22% of individuals were assigned to the subpopulation from which they were sampled. The Bayesian approach implemented in STRUCTURE also confirmed that all examined subpopulations should be treated as a single group, indicating a high level of gene flow. There was some evidence for female philopatry (genetic differentiation was greater in maternally-inherited mtDNA than nuclear DNA) and male-biased dispersal, e.g., H_O and the variance of mean assignment were significantly higher in males than in females. Twelve individuals (seven females and five males) were identified as potential first generation migrants. Their migration routes ranged from 60–283 km in females ($\bar{x} \pm SE = 177.9 \pm 29.37$) to 27–385 km in males (206.4 ± 58.95); surprisingly, no sexual differences were observed and this finding suggests that female-mediated gene flow may occur. MtDNA also produced a strong genetic signal for the demographic expansion (Fu's F_S statistics, $F_S = -26.30$, $P < 0.01$ and a star-shaped haplotype network), which took place roughly 33,000 years BP, i.e., before the Last Glacial Maximum. The genetic uniformity of the Polish population implies that there is no migration barrier to EBLV-1, at least within the country, and the potential threat of rabies virus spreading via migration of infected animals may be higher than previously thought.

Key words: population genetics, microsatellites, mitochondrial DNA, dispersal, rabies, EBLV-1a, *Eptesicus serotinus*, Poland

Environmental factors affecting the differential use of foraging habitat by three sympatric species of *Pipistrellus*

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We identified several ecological parameters that may promote the foraging habitat differentiation by sympatric bat species. The exploitation of discrete habitats was shown to facilitate the coexistence of morphologically similar species. Bats represent a model species group, where many morphologically similar species exploit similar resources, e.g. insects as prey organisms. We studied three closely related species of bats in a Central European region of sympatric occurrence – the common pipistrelle (*Pipistrellus pipistrellus*), Nathusius' pipistrelle (*P. nathusii*), and the soprano pipistrelle (*P. pygmaeus*). We employed point locality data and niche-based species distribution modelling (maximum entropy modelling, 'MaxEnt') to model the habitat use by these species. A restricted distribution of *P. pygmaeus* and *P. nathusii* compared to *P. pipistrellus* was observed that may indicate a stronger habitat specialization of these two species compared to *P. pipistrellus*. Land cover, as well as several climatic variables influenced the habitat use of all three species (e.g., the precipitation in spring, and the temperature minimum in late summer). Despite an overlap in foraging habitat parameters, differences among species concerning their preferred habitat were noted. Responses to isothermality, mean diurnal range of temperature, temperature seasonality, and land cover differed among species. The data identify microclimatic factors, besides vegetation and other land cover types, as important effectors for habitat partitioning in these three *Pipistrellus* species.

Key words: ecological niche modelling, habitat, MaxEnt, microclimate, niche partitioning, *Pipistrellus*

Food intake changes in relation to food quality in the Neotropical frugivorous bat *Sturnira ludovici*

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If nutritional elements of food and the consumer's ability to use them can determine an animal diet, we can expect that differences in digestive capacity between animals reflect their dietary breadth. Diet diversity in Neotropical frugivorous bats is based on core plant taxa that present different nutritional compositions and qualities. *Sturnira* bats eat fruits with high sugar concentration, while *Artibeus* species eat fruits with lower sugar content. In this study we investigated the intake sugar response of *Sturnira ludovici* and compare it with the intake response reported for *Artibeus jamaicensis*. Our results show that *S. ludovici* was unable to achieve compensatory feeding, ingesting twice the energy when feeding on the most concentrated solution with respect to the more diluted one. This finding suggests the existence of a physiological constraint limiting energy intake when this species feeds on low quality food. Intake response slope value for *S. ludovici* was lower than the one reported for *A. jamaicensis*, indicating that *S. ludovici* is less suited than *A. jamaicensis* to feed on food with low nutrient content. The role that a physiological limitation could have on the food intake of *S. ludovici*, and the ecological implications of our findings are discussed.

Key words: *Artibeus*, compensatory feeding, intake responses, Phyllostomidae, sucrose

Seasonal variation in the diet of the bat *Anoura caudifer* (Phyllostomidae: Glossophaginae) at the southern limit of its geographic range

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Glossophagine bats feed mainly on flower products, but often eat also insects and fruits. The composition of their diet may change according to climate seasonality. In the present study we analyzed the diet of the bat *Anoura caudifer* at the southernmost limit of its geographic distribution, the Atlantic Forest of southern Brazil. We identified food items and plant species consumed by *A. caudifer* and tested the hypothesis that its diet varies seasonally. We collected fecal material monthly from October 2003 to September 2004 in a day roost of *A. caudifer*. We obtained a total of 1,166 fecal samples: 1,029 (88%) samples contained pollen, 592 (51%) contained insects, and 196 (17%) contained seeds. The hypothesis that diet varies seasonally was corroborated. There was high consumption of nectar and pollen in all seasons, especially in spring (98%), high consumption of insects mainly in summer and autumn (60%), and high consumption of fruits in winter (41%) and summer (24%). *Anoura caudifer* consumed pollen and nectar of 10 plant species, mainly of *Marcgravia polyantha*, and fruits of six species, mainly of *Piper gaudichaudianum*. *Anoura caudifer* has primarily a pollinivorous/insectivorous diet at the southern limit of its distribution, and, in contrast to other studies, it also eats fruits at some times of the year. Visits to flowers of 10 species, four of which not matching the syndrome of chiropterophily, and consumption of fruits of six species indicate a generalistic behavior of *A. caudifer* in the study area. This flexibility may have been crucial to the maintenance of *A. caudifer* populations at the southern limit of its distribution, and also for the persistence of bat-pollinated plants in local ecosystems.

Key words: Atlantic Forest, Brazil, *Eucalyptus*, foraging, *Marcgravia polyantha*, nectar-feeding bat

Distribution, abundance and roosts of the fruit bat *Artibeus fraterculus* (Chiroptera: Phyllostomidae)

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Where does a species live? How common is it? Where does it spend its inactive periods? These are basic questions about the biology of a species, which bring key information for application in conservation and management. Unfortunately, this information is available for only a minimum fraction of all animal species. Using 1) ecological niche modeling with maximum entropy (Maxent), 2) relative abundance estimates using museum records, and 3) field surveys of roosting sites, we report the fraternal fruit-eating bat, *Artibeus fraterculus*, as having a distribution limited to the Tumbesian ecoregion in Ecuador and west central Peru, being the relatively most abundant bat species throughout its range, with healthy populations which are primarily sustained by cultivated and introduced plants, and using human-made constructions as roost sites. Additionally, we described a large congregation of individuals of this species in a single roost, representing the largest colony reported for the genus *Artibeus*. These results may indicate resilience of *A. fraterculus* to human disturbance.

Key words: bat roost, ecological niche model, Tumbesian ecoregion

The dawn bat, *Eonycteris spelaea* Dobson (Chiroptera: Pteropodidae) feeds mainly on pollen of economically important food plants in Thailand

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The diet of *E. spelaea* was determined for bats captured monthly between June 2002–June 2003 at a cave entrance in Songkhla Province, Southern Thailand. Faecal analysis and pollen collected from the bats' fur were used to identify the plant species ingested. From 1,155 diet records from 506 samples, at least eleven plant taxa were identified. Individual bats feed on flowers of up to six plant species each night. *Parkia* spp. (34%) and *Musa* spp. (28%) have the highest percentage frequency followed by *Eugenia* spp. (9.4%), *Oroxylum indicum* (6.4%), *Durio zibethinus* (6.2%), *Ceiba pentandra* (5.5%), *Sonneratia* spp. (5.2%), while *Cocos nucifera* and an unknown plant species, made up a minor proportion (<2.5%). *Parkia* and *Musa* were the main dietary items of *E. spelaea* in nearly every month, while the remaining components of the diet varied seasonally. *Durio* spp. is an important contributor to the diet during March–April (39–42%). The results from pollen collected from fur generally corresponded with those from faecal analysis, but *Musa* spp. had a higher percentage frequency on the fur (34%) than *Parkia* spp. (23%). The dawn return patterns of the bats to their roosts differ significantly between sexes. Most mature males return early in the night while most females return at dawn. Earlier returning males were significantly heavier than those returning later. This return pattern is similar to that reported during the breeding period for those polygynous fruit bats that maintain a harem. Thus, these results suggest that *E. spelaea* may exhibit a resource-defence polygynous mating system.

Key words: *Eonycteris*, diet, faecal analysis, nectarivorous bat, *Parkia*, pollen, polygyny, return pattern

Subterranean watercourses may ‘rescue’ seeds dispersed by fruit-eating bats in caves

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Seeds of several plant species are frequently wasted, if dispersed to unsuitable microsites. Some microsites, such as the interior of large caves, are unsafe for animal-dispersed seeds. However, sometimes a second dispersal agent may give these seeds a second chance of survival, thus playing the role of ‘seed rescuer’. We tested this hypothesis by investigating the seed fate of plant species dispersed by fruit-eating bats in an Amazonian cave and by evaluating whether those seeds could be rescued by a subterranean watercourse. We measured seed arrival at the ground and the watercourse. We also collected seeds coming out of the cave through the watercourse. *Banara* sp. was the most abundant morphospecies, followed by *Cecropia* sp., *Solanum* sp. and *Vismia* sp. We collected 1,751 seeds of seven morphospecies in water. *Cecropia* sp. was the most abundant species. Experimental data showed that on average 37% of the seeds of *Banara*, *Vismia*, and *Cecropia* leaving the cave were viable. A second experiment detected differences in the germinability of *Cecropia* seeds soaked in cave water for one, 10, and 20 days, but the same was not true for *Piper* seeds. Although caves are unsuitable for plant species dispersed by fruit-eating bats, some seeds may be rescued by nonstandard means of dispersal and dispersed to river margins, where they may germinate and establish themselves.

Key words: Amazon, diplochory, long-distance dispersal, nonstandard seed dispersal, secondary dispersal

Where and at what time? Multiple roost use and emergence time in greater horseshoe bats (*Rhinolophus ferrumequinum*)

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One of the largest nursery colonies of *Rhinolophus ferrumequinum* in Italy occurs in the Natural Park of Migliarino San Rossore Massaciuccoli, Tuscany, with the species roosting in several buildings. We identified various roosts used by *R. ferrumequinum* within the park and investigated their microclimatic parameters (temperature, relative humidity and daily temperature excursion). We monitored roost use for one year and found it not only to be influenced by season and the microclimatic conditions of different roosts, but also by occasional stress conditions such as disturbance by predators. We also studied nightly emergence behavior, specifically we considered how this is influenced by climatic (temperature, relative humidity and evening light intensity) and demographic (presence of pups, subadults and colony size) parameters. The colony always performed a pre-emergence behavior and we found that its onset occurred earlier at higher temperatures, lower evening light intensity, in larger colonies and in the presence of pups. High temperature and low evening light intensity also resulted in a longer nightly emergence, which was also identified in larger colonies and when subadults were present. This study highlights the importance of the conservation of multiple roosts within the distribution range of *R. ferrumequinum* nurseries. Additionally, we demonstrated how certain climatic and demographic factors influence both pre-emergence and emergence behavior.

Key words: *Rhinolophus ferrumequinum*, bats, ecology, emergence time, roost use, light-sampling

Factors influencing the emergence times of sympatric insectivorous bat species

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The onset of activity in animals restricted to being active for only part of the day is one of the most fundamental aspects of their biology because it marks the beginning of activities that they need to do to survive and reproduce. Initiation of activity is subject to several factors including presence/absence of predators and the vagaries of environmental conditions at the time of emergence. We tested if the emergence times amongst seven species of sympatric insectivorous bats were explained by predation risk, insect activity and weather conditions. We measured bat emergence times by recording echolocation calls. Peak emergence was correlated with body size, time of sunset, foraging strategy and diet, factors associated with risk of predation. Larger, faster flying bat species emerged earlier than smaller, slower flying species suggesting the former relied on flight speed to avoid predation. Clutter foragers emerged earlier than clutter-edge and open foragers, suggesting that vegetative cover is important for bats trying to avoid predation. Bats feeding on Lepidoptera emerged earlier than bats feeding on Diptera. However, insect peak activity was highly variable and did not differ between orders or time of season. Emergence time was not correlated with any of the weather variables we measured. These results suggest that predation influences fundamental aspects of the biology and ecology of insectivorous bats by determining when it is safe to become active.

Key words: diet, insect activity, foraging strategy, peak emergence, predation, weather

Southeastern myotis (*Myotis austroriparius*) roost selection in cypress-gum swamps

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Roost characteristics have been described for most North American bats, but debate continues over the ultimate mechanisms behind roost selection. Hypotheses include the need for a stable microclimate, protection from predators, proximity to foraging habitat, and availability of alternative roosts, among others. Our objective was to weigh evidence for hypotheses regarding selection of diurnal summer roosts using southeastern myotis (*Myotis austroriparius*) as a model. We used transect searches and radiotelemetry to locate 25 roosts at eight study sites across the Coastal Plain of Georgia, USA. We measured 22 characteristics of trees, at all occupied roosts and at randomly selected unoccupied trees. We evaluated 10 hypotheses using single-season occupancy models. The best supported model predicted bat presence based on the variables tree species, solid wood volume, and canopy cover. Because these characters affect heat retention and insolation, our results are consistent with the hypothesis that bats select roosts that provide a favorable microclimate. However, data on roost temperature and humidity are needed for a conclusive determination. Occupancy was greatest at the study area closest to caves occupied by southeastern myotis. Water tupelo trees appear to be an important resource for this species, although proximity to suitable caves also seems to affect presence and should be considered in conservation planning.

Key words: Coastal Plain, Georgia, *Myotis austroriparius*, *Nyssa aquatica*, radiotelemetry, roost selection, southeastern myotis, tree cavities, water tupelo

Temperatures beneath bark of dead trees used as roosts by *Myotis volans* in forests of the Pacific Northwest, USA

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Few studies have examined temperatures inside bark roosts of tree-roosting bats. We measured temperatures beneath plates of exfoliating bark of six species of dead trees used for roosting by long-legged myotis (*Myotis volans*) from June to July 2003–2006 in Idaho and Oregon, USA, and compared these across tree species and with ambient temperature (T_A). Temperature profiles beneath bark oscillated within the range of T_A , demonstrating the ability of bark cavities on dead trees to insulate against daily extremes in maximum and minimum T_A . Slope position affected the difference in bark cavity temperature from T_A during daytime periods, with bark cavities on dead trees in upper slope positions being cooler than T_A compared to bark cavities on dead trees in lower slope positions. Differences in bark cavity temperatures from T_A varied among dead tree species during nighttime periods, with white fir (*Abies concolor*) and ponderosa pine (*Pinus ponderosa*) warmer than T_A compared to other dead tree species. Mean daily maximum temperatures beneath bark of dead white fir, grand fir (*Abies grandis*), western white pine (*Pinus monticola*), and ponderosa pine met or exceeded the theoretical lower critical temperature (T_{LC}) of long-legged myotis (range = 29.7–30.5°C) within several hours of sunset, but were substantially colder for much of the day. These data indicate long-legged myotis roosting beneath bark of dead conifer trees likely experience temperatures conducive to use of torpor during early morning hours, with potential for passive re-warming in late afternoon facilitated by increases in daily temperatures beneath bark prior to evening emergence.

Key words: coniferous forests, Idaho, long-legged myotis, *Myotis volans*, Oregon, roost microclimate, torpor

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Post-cranial hairs in four families of bats

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This study identifies the presence of specialized post-cranial hairs on 66 species of bats, and speculates on their significance. While examining museum bat specimens, three main suspected sensory types of hair were discovered: toe hairs, rump hairs, and uropatagial hairs. Life history traits such as day roost type, size of roosting group, and diet were compared with the presence or absence of these hairs using Spearman's Rho tests. The presence of post-cranial hairs was extremely variable across families and genera, making their function difficult to infer. Nevertheless, our tests revealed statistically significant correlations between the presence of uropatagial hairs and using small roosts and the presence of rump hairs and using hollow tree roosts. We suggest that rump hairs may play an important role in roost navigation, while uropatagial hairs may contribute to landing or foraging abilities, especially when found on tailless bats. Toe hairs are suspected to aid in grooming. Histological analysis and further behavioral data are needed to ascertain the functional role of these post-cranial hairs.

Key words: Chiroptera, rump hairs, tactile hairs, toe hairs, uropatagial hairs

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Absolute and relative secondary-sexual dimorphism in wing morphology: a multivariate test of the ‘Big Mother’ hypothesis

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In many bat species, average body size of females is larger than males. One common explanation is that larger females exhibit greater reproductive success. One avenue whereby increased size could positively affect fitness is by improving aerodynamic performance. We examined secondary sexual size dimorphism in wing elements of *Artibeus lituratus*. In particular we examined absolute differences, relative differences after controlling for disparities in body size, and differences in the degree of morphological integration of wing elements. Females were absolutely and relatively larger than males in many wing elements and exhibited no difference in morphological integration. Absolute and relative differences in size of wing elements are likely related to enhanced aerodynamic performance in females, especially related to weight gain during reproduction. Future studies should examine patterns of dimorphism across the geographic distribution of this species to better understand the particular ecological and environmental context in which such size differences manifest.

Key words: *Artibeus lituratus*, Big Mother hypothesis, morphological integration, secondary-sexual dimorphism, wing morphology

Can some Australian bats take advantage of flat-plate aerodynamics?

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The fifth digits (D5) of 22 species of Australian bats were compared. Unloaded, all species had positive wing camber values between 6.5 and 11.4%. During the measurements on live individuals two species were observed to entirely straighten D5, including the inherently cambered metacarpal-5 (M5) (1.5 to 5.6%). To explain this capability, preserved specimens of all species were assessed in terms of the metacarpal's unloaded camber, tendon alignments, cross-sectional aspect ratio, various length ratios, bending stiffness, bone density and tendon insertions onto the metacarpo-phalangeal joint. The four species that migrate or commute long distances at high speeds have anatomical mechanisms that could eliminate the camber of their fifth digit, including its metacarpal, thereby optimising their high flight speed performance (*Mormopterus beccarii*, *M. loriae*, *M. planiceps* and *Tadarida australis*). They were distinctive among the 22 species assessed because: (1) their extensor tendon was aligned directly above the M5's elastic axis over the full length of the bone, (2) this tendon had additional insertions in the metacarpo-phalangeal joint that were correctly positioned to straighten the positive camber inherent in the M5, (3) the metacarpo-phalangeal joint capsule was appropriately reinforced to support the additional insertions, (4) their M5 showed a distinctive pattern of bending stiffness values in the sagittal plane appropriately graded for straightening the bone and (5) when exposed and tensioned manually, the extensor tendon did straighten the shaft of M5.

Key words: bats, flight, metacarpal, camber, speed

Bat incidents with U.S. civil aircraft

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Wildlife collisions with aircraft (hereafter incidents) threaten human safety and cause substantial economic loss. Although more than 97% of wildlife incidents with U.S. civil aircraft involve birds, damage is more than 4.5 times more likely to occur during a mammal incident (e.g., deer, canids). Bats are the only mammals with the potential to be struck by aircraft outside the airport environment (at least 152.4 m above ground). We examined the Federal Aviation Administration's (FAA) National Wildlife Strike Database from 1990 to 2010 to estimate the frequency of bat incidents with aircraft within the U.S. and the risk relative to other wildlife incidents. We summarized 417 bat incidents with U.S. civil aircraft. There were 10 bat species or species groups involved in these incidents; however, 68.9% were not identified to species. Most (85.7%) bat incidents occurred at Part 139 certificated airports that receive regularly-scheduled passenger flights with more than nine seats or unscheduled flights with more than 30 seats. More incidents occurred during August (28.3%) than any other month. Most bat incidents occurred at night (81.7%), but the greatest incident rate occurred at dusk (57.3%). More incidents occurred during aircraft landing (85.0%) than take-off (11.2%) or other phases of flight (3.7%). 'Minor' damage to aircraft occurred on only two occasions but no damage costs were reported. Incidents coincided with bat behavior, including diel activity, migration, hibernation, and juvenile recruitment. We conclude bat incidents are low risk to U.S. civil aircraft and have minimal economic effect on the U.S. civil aviation industry.

Key words: airport, airport management, aviation hazard, bats, United States, wildlife-aircraft incident, wildlife strike

A checklist of bats (Mammalia: Chiroptera) from Lao PDR

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This paper provides the first comprehensive review and detailed documentation of available information on the distribution and occurrence of bats in Lao PDR. Information was gathered from literature records, survey data, and museum collections. Detailed locality information, by province (with co-ordinates where available) and maps, along with details on specimens or published references are provided for each species. Based on these records, the bat checklist for Lao PDR comprises 90 species of seven families: Pteropodidae (nine species), Emballonuridae (three species), Megadermatidae (two species), Rhinolophidae (16 species), Hipposideridae (11 species), Vespertilionidae (47 species) and Molossidae (two species). Many of these records have not been previously published and several corrections are provided to previously published records, based on revised identifications as well as new taxonomic information. Nevertheless, many gaps remain in the information available on the bats of Lao PDR. No records were available from two provinces, and many species known from adjacent countries have not yet been documented in Lao PDR; thus, it is anticipated that the species list will increase with further field research.

Key words: biodiversity hotspot, Southeast Asia, distribution, conservation status, locality records, specimen holdings

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