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Review

Echos in the Night: Anthropogenic Bat Mortality and Its Implications for Conservation

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Abstract: Bats are essential for ecosystem functioning, acting as pollinators, seed dispersers, and natural pest controllers. Their ecological services are critical for agriculture, reducing crop losses and minimising the need for chemical pesticides, thereby supporting food security. However, bat populations face multiple, often synergistic threats, including habitat loss, climate change, diseases such as white-nose syndrome, wind energy developments, and pesticide exposure. These pressures not only threaten bat survival but also disrupt ecosystem processes and agricultural productivity. Despite their importance, bats often receive limited conservation attention due to misconceptions and their elusive behaviour. Recent initiatives emphasize habitat restoration, disease management, public education, and the use of advanced monitoring and genetic techniques to inform targeted interventions. Effective conservation requires integrated strategies combining policy, research, and community engagement. Protecting bats is crucial to maintain biodiversity, ensure sustainable agriculture, and safeguard food systems, highlighting the need for immediate, coordinated conservation action.

Keywords: chiroptera; ecology poisoning; trauma; pathology; climate change; conservation

1. Introduction

Bats are placental mammals belonging to the order Chiroptera, which is divided into two suborders: Yinpterochiroptera and Yangochiroptera (Figure 1) [1]. According to their evolutionary history, their origins can be traced to the Palaeocene–Eocene boundary, approximately 56–54 million years ago, a period marked by significant climatic and ecological shifts that may have facilitated the diversification of early chiropterans [2]. Their phylogenetic analysis supports the monophyly of bats and suggests that the earliest bats possessed morphological adaptations for flight and echolocation, underscoring a rapid evolutionary transition from terrestrial to volant lifestyles. A phylogenetic relationship between bats and other placental mammals was identified, placing chiropterans within Laurasiatheria together with carnivores, ungulates, and cetaceans [2]. They are an exceptionally diverse group with the unique ability to fly, often travelling great distances during seasonal migrations [3]. Most bats are nocturnal and tend to form large colonies when roosting in caves, trees, or human-made structures [4]. Some species hibernate during colder months [5]. This order represents nearly 20% of all known mammal species globally at the moment, with more than 1,400 species according to the IUCN database. It is important to mention that these numbers are dynamic and subject to taxonomic updates [6]. Bats inhabit almost every continent, except for extremely frigid areas like Antarctica and the Arctic [3]. Bats exhibit remarkable trophic plasticity, consuming a wide range of prey, including insects, fruits, nectar, and even small vertebrates, allowing them to occupy distinct ecological niches. This dietary adaptability has been a key driver of their adaptive radiation, facilitating the colonization of diverse habitats and promoting speciation across varied ecological contexts. For instance, frugivorous and nectarivorous bats have evolved specialized dentition and sensory adaptations to exploit floral and fruit resources, while insectivorous species have refined echolocation systems to target specific prey types, illustrating how trophic specialisation has reinforced niche differentiation and contributed to the extensive biodiversity observed within Chiroptera [7].

Bats are crucial in both natural ecosystems and human economies [3]. As pollinators, bats contribute to provisioning services by facilitating the reproduction of economically valuable plants, including those that produce fruits, seeds, and other resources vital to both natural ecosystems and agricultural systems. In their role as insect predators, they provide essential regulating services by controlling insect populations, thereby mitigating crop pests and reducing the spread of vector-borne diseases. Additionally, their seed dispersal activities support ecosystem services by aiding in forest regeneration and maintaining plant diversity, which in turn stabilises habitats and promotes overall ecological resilience. Their droppings (guano) serve as a valuable natural fertiliser [8]. Additionally, bats support rural economies through ecotourism and, in some regions, serve as a food source [9,10].

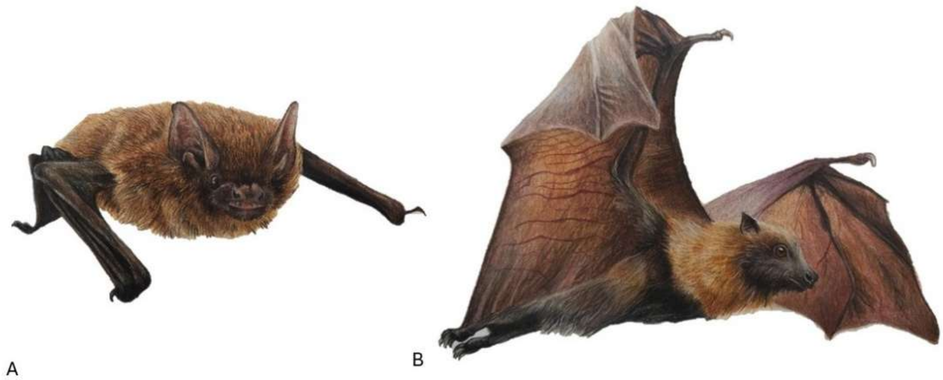

Figure 1. Illustration and Yangochiroptera (**A**) and Yinpterochiroptera (**B**) (Author Illustration: Andreia Garcês).

As of the most recent IUCN assessment, approximately 16.5% of the over 1,400 bat species are classified as threatened, primarily under criteria such as A2c (population decline driven by habitat destruction) and B1ab (restricted range, habitat fragmentation, and decline in habitat quality) [1]. However, this percentage varies considerably across biomes. In tropical forests, where over 60% of bat species are found, habitat loss due to deforestation, agricultural expansion, and mining has led to elevated threat levels, with up to 25% of species categorised as vulnerable, endangered, or critically endangered. In arid and semi-arid regions, water scarcity and desertification exacerbate resource limitations, impacting foraging habitats and roost availability, contributing to higher extinction risks for specialised insectivorous and nectarivorous species. Coastal and island ecosystems also present unique threats, with endemic bat populations facing severe pressures from invasive species, habitat fragmentation, and extreme weather events intensified by climate change. By delineating these biome-specific threat patterns, targeted conservation measures can be more effectively tailored to address localised risks, enhancing the resilience of bat populations globally [2]. Some examples of endangered species include *Chalinolobus dwyeri, Pipistrellus maderensis, Plecotus sardus,* and *Coleura seychellensis*, among others, according to The IUCN Red List of Threatened Species [3].

Bats face a variety of threats leading to their decline [4]. Habitat destruction has resulted in the loss of critical roosting sites such as caves, old-growth forests, and hollow trees, disproportionately affecting bat species with high roost fidelity. According to the Refuge Theory, species that rely on specific, limited habitats for roosting are particularly vulnerable to habitat fragmentation, as the loss of refugia can lead to population declines and increased extinction risk [5]. Additionally, the Habitat Specialist Sensitivity Hypothesis posits that species with specialised roosting requirements exhibit lower ecological flexibility, making them more susceptible to habitat alterations [6]. For instance, cave-dependent species that exhibit strong roost fidelity may face heightened extinction risks as cave networks are disrupted by mining or tourism, while old-growth forest specialists may struggle to adapt to fragmented landscapes with fewer suitable roosting sites [7]. The increase in extreme weather events such as droughts, hurricanes, and heat waves has impacted bat populations by affecting food availability, migration patterns, and hibernation cycles [8]. Some bat species are hunted for bushmeat and traditional medicine. For example, large fruit bats (*Pteropus mariannus, P. vampyrus*, and *P. alecto*) are particularly vulnerable to this activity [9]. Human eradication of bats is often driven by fear, superstition, or concerns about infectious diseases, underscoring how public perception and misinformation can exacerbate biodiversity loss. Misconceptions about bats as disease vectors or harbingers of misfortune can lead to harmful practices, such as roost destruction or indiscriminate culling, which not only threaten bat populations but also disrupt essential ecological functions like pollination and pest control. This emphasises the critical role of science communication in reframing public narratives, promoting evidence-based understanding of bats' ecological importance, and fostering coexistence strategies that mitigate conflict while safeguarding biodiversity [10]. The rise of new infectious diseases, such as white-nose syndrome (a fungal disease caused by *Pseudogymnoascus destructans*), has been responsible for a 94% decline in populations of little brown myotis (*Myotis lucifugus*) [11] and northern long-eared bats (*Myotis septentrionalis*) in eastern Canada and the USA since its identification in 2006 [12]. Collisions with wind turbines are estimated to kill thousands of bats annually, illustrating a critical ecological trade-off between renewable energy development and biodiversity conservation [13]. While wind energy offers substantial benefits in mitigating climate change, its rapid expansion has led to unintended consequences for bat populations, particularly migratory and echolocating species drawn to turbine structures [14]. Domestic cats (*Felis catus*) and vehicle collisions have also been identified as sources of bat mortality [15,16]. Artificial lighting—whether in streets, at turbine bases, or around human dwellings—alters bat behavior: lights can attract insects (thus drawing foragers), but also increase predation risk and force bats to shift flight paths into cluttered cover for protection [17]. Natural predators (e.g., owls, weasels) also contribute to bat mortality. Even though predation is a natural ecological interaction, human activities often exacerbate it: artificial roosts may be poorly designed, poorly located, insufficiently camouflaged, or lacking escape routes, making them easier targets; lighting around roosts can illuminate entering/exiting bats, facilitating predator attacks. A recent study in southern Spain documented continuous low-intensity predation by tawny owls (*Strix aluco*) on Nyctalus lasiopterus in a colony using natural and artificial roosts, showing even modest predation can threaten small or isolated populations—especially when roost switching is not feasible due to scarcity of suitable sites [18].

Understanding the various causes of bat mortality is essential, as this knowledge can help shape conservation efforts, monitoring programs, and mitigation strategies to protect bat populations [15,16]. This work aims to review the existing literature to identify trends in the causes of mortality in Chiroptera worldwide, particularly connected to anthropogenic factors.

2. Materials and Methods

In this narrative review, the authors present a review of the mortality patterns of free-ranging bats associated with anthropogenic factors [19]. The initial search on the Web included terms used in combination or isolation, such as "bat," "Chiroptera," "Yinpterochiroptera," "Yangochiroptera," "causes of death," "mortality," and/or "post-mortem," yielding articles from digital databases (Web of Science, Scopus, PubMed, SciELO, Research Gate, Google Scholar). Figure 2 shows the flow diagram of data collection for the systematic review according to the guidelines PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses), 2000 [19]. The inclusion/exclusion steps were independently reviewed by the two authors of the paper. The final selection comprised 240 articles deemed suitable for inclusion in this review from 1890 to 2024. Only peer-reviewed articles were included. The criteria of inclusion were: (i) relevance to the impacts of anthropogenic factors (e.g., roads, wind turbines, artificial lighting, predation) on bat ecology and conservation; (ii) publication in peer-reviewed journals to ensure scientific rigor; (iii) clarity of methodology and data, excluding anecdotal or non-systematic reports; and (iv) geographic and taxonomic diversity, to ensure representation of different bat species, habitats, and regions. Articles not meeting these criteria, such as grey literature, conference abstracts, were excluded. Only papers in which the species, country, year, and cause of death were available were included. Another selection criterion was language, with only manuscripts in English, Portuguese, Spanish, and French being considered.

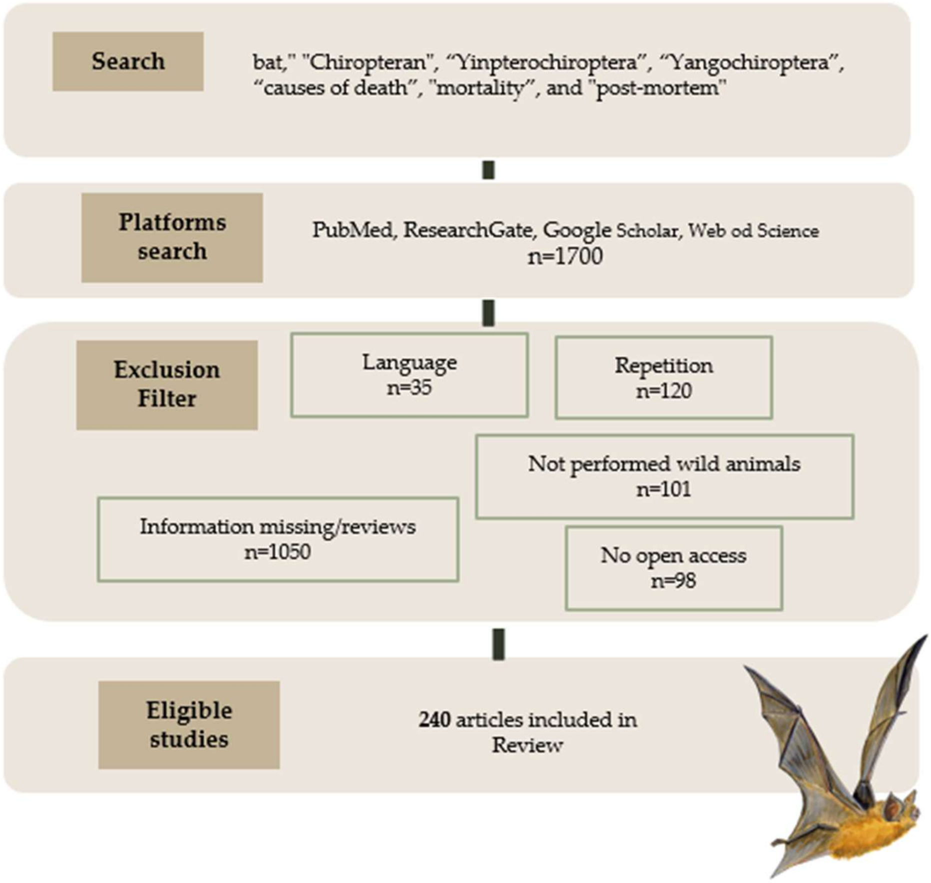

Figure 2. Flow diagram of data collection for the review.

Regarding the categories of mortality, the data available in the papers were highly diverse. To streamline analysis, the authors classified bat mortality factors into ten distinct categories, a pragmatic approach that enhances clarity while facilitating comparative analysis. This classification framework was developed through a combination of thematic analysis and expert consensus, aligning with similar taxonomic frameworks in ecological and forensic studies on wildlife mortality [20]. Validating this categorization against established frameworks not only bolsters scientific rigour but also ensures consistency with previous research, enabling more robust cross-study comparisons. The 10 categories as follows: vehicle collision, wind farms, electrocution, shotgun (animals with ammunition found in the carcass), anthropogenic causes (animals killed directly due to persecution or vandalism, or indirectly due to habitat destruction), natural disasters (storms, hurricanes, floods, among others), predation (animals killed by cats or dogs, natural predators were excluded), bushmeat (animals hunted for consumption or sale in markets), infectious diseases (caused by viruses, bacteria, fungi, parasites, or other pathogenic agents), and poisoning (due to pesticides, rodenticides, or other toxic compounds). There were no overlapping categories in the animals included in this study. Cases of predation by invasive species were not included, since some species attack bats in their natural habitat.

3. Results

In this review, 240papers were included that examined the causes of mortality of free-ranging Chiroptera from 1890 to 2024.

3.1. Taxonomy

The papers included in this review described 154 bat species, the most common being *Pteropus poliocephalus* (n = 24), *Eptesicus fuscus* (n = 26*), Myotis lucifugus* (n = 26), and *Tadarida brasiliensis* (n = 27). These species were divided into 13 Families, *Vespertilionidae* (n = 14) and *Pteropodidae* (n = 79) being the predominant ones (Figure 3).

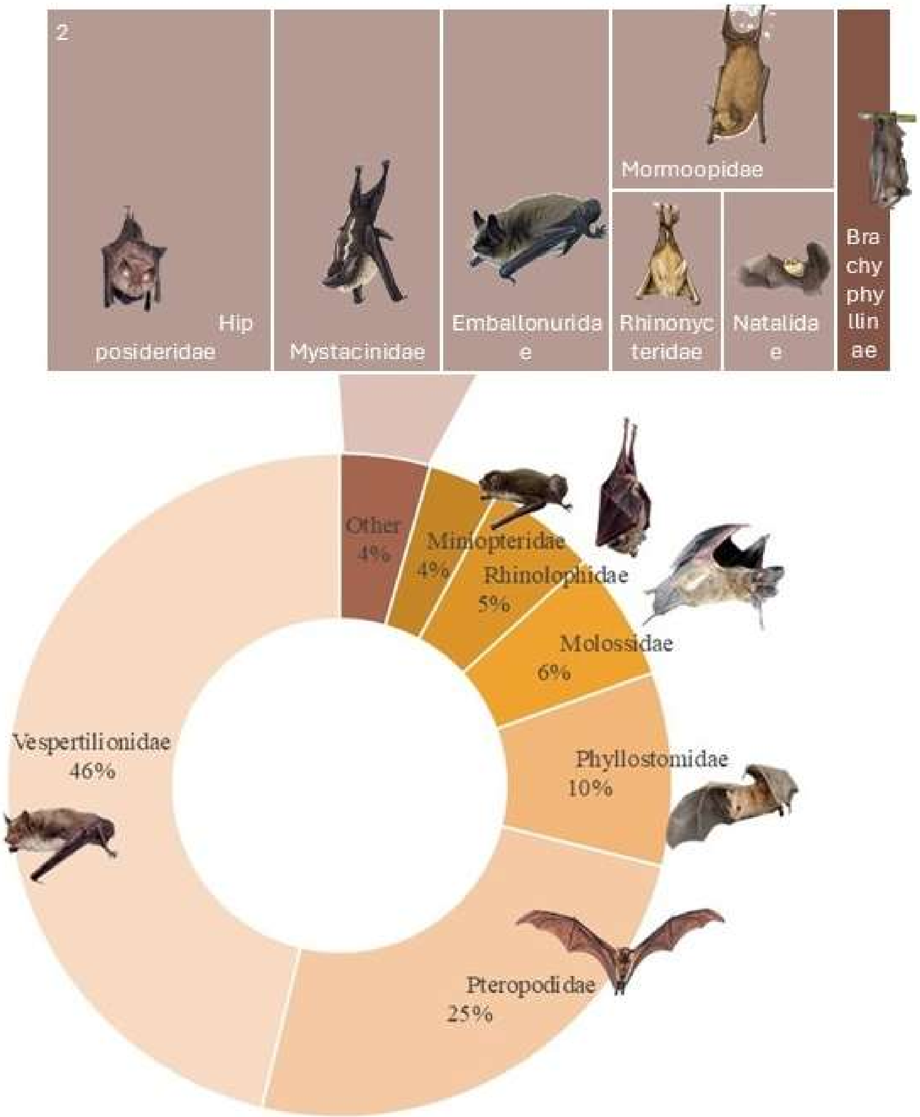

Figure 3. Prevalence of Chiroptera Family included in this review (Author: Andreia Garcês).

3.2. Geographical Distribution of Mortality Events

The geographical spread of the events demonstrates that bat populations are under pressure worldwide. North America (n = 112) and Australia (n = 37) were the regions with the most reported mortality events. Mortality events have been reported on every continent except Antarctica and the Arctic. Figure 4 illustrates the worldwide distribution of mortality studies focused on various bat species.

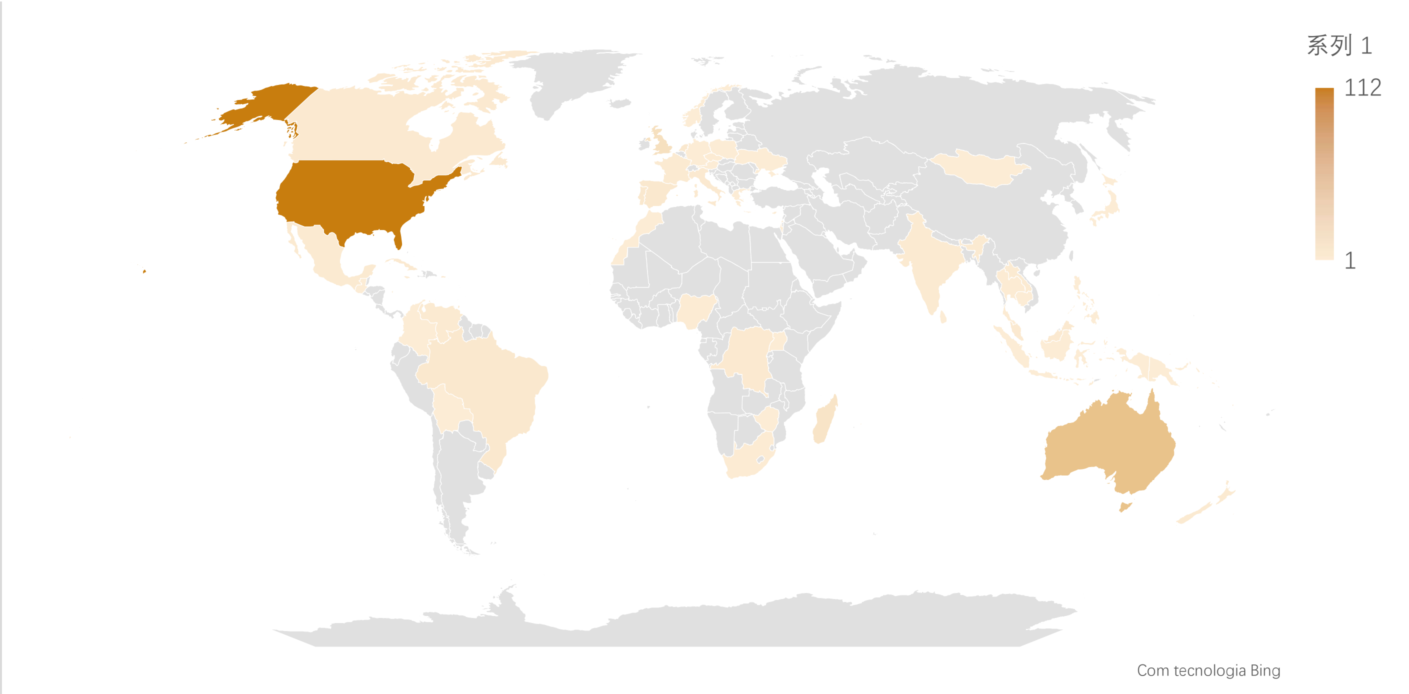

Figure 4. Distribution of bat mortality events worldwide (Author: Andreia Garcês).

3.3. Mortality Causes

The major causes of mortality described in the various papers were as follows: predation (n = 59), anthropogenic causes (n = 56), natural disasters (n = 53), poisoning (n = 39), bushmeat hunting (n = 28), shotgun injuries (n = 14), wind farms (n = 12), infectious disease (n = 9)), roadkill (n = 5), and electrocution (n = 1). Table 1 presents the different causes of death associated with the countries where these studies were conducted.

In the USA, the primary causes of mortality were natural disasters (n = 20) and predation (n = 20) [19–21]. In Australia, natural disasters were the main cause of mortality (n = 20) [21,22]. Among the *Vespertilionidae* family, the leading cause of death was predation (n = 15), while in the *Pteropodidae* family, it was natural disaster (n = 15) (Figures 5,6).

Mortality associated with poisoning sometimes occurs accidentally (when trying to eliminate other pests) or when attempting to eliminate bats from houses or agricultural fields. The compounds associated with poisoning include lead [23], lindane [24], chemical treatment of timbers for wood-boring insects and decay [25], dieldrin [26], pentachlorophenol [27], diphacinone [28], DDD, endrin [29], Carbamate [30], blue-green algae neurotoxin [31], DDT, chlordan [32], and strychnine [33,34] (see Table 1 and Appendix A-Table A1).

Mortalities associated with natural disasters were linked to high ambient temperatures, leading to hyperthermia, stress, and starvation due to food shortages [35,36]. Episodes of very low temperatures were also associated with bat mortality in some regions [37]. Other phenomena such as severe droughts, floods, typhoons, cyclones, and volcanoes have also been identified as contributing factors [38–40] (see Table 1 and Appendix A-Table A1).

Table 1. Distribution of the causes of mortality among bats across the different countries.

	Mortality Causes									
Country	**Poison**	**Natural Disasters**	**Predation**	**Infectious**	**Wind Farms**	**Roadkill**	**Anthropogenic Causes**	**Bushmeat**	**Shotgun**	**Electrocution**
Australia	2	20	1	2	0	0	5	0	2	1
UK	6	0	4	0	0	0	1	0	1	0
Netherlands	5	0	0	0	0	0	0	0	0	0
USA	11	20	20	2	8	0	15	0	5	0
France	1	0	0	1	0	0	1	0	0	0
Spain	0	0	2	0	3	0	0	0	0	0
Portugal	0	0	1	0	1	0	0	0	0	0
Brazil	0	0	0	0	1	3	1	0	0	0
Canada	1	0	0	1	0	0	4	0	0	0
Mexico	1	0	0	0	0	0	1	0	0	0
Madagascar	0	0	0	0	0	0	5	4	0	0
Democratic Republic of Congo	0	0	0	0	0	0	3	0	1	0
Trinidad	1	0	0	2	0	0	2	0	0	0
Venezuela	1	0	1	0	0	0	0	0	0	0
Italy	0	0	2	0	0	0	0	0	0	0
New Zealand	0	1	1	0	0	0	0	0	0	0
Germany	1	0	0	0	0	0	0	0	0	0
Poland	0	0	0	0	0	1	0	0	0	0
South Africa	0	1	1	0	0	0	0	0	0	0
Thailand	0	0	0	0	0	0	1	1	0	0
Malaysia	0	0	0	0	0	0	0	3	0	0
India	0	0	0	0	0	0	1	1	0	0
Japan	0	0	1	0	0	0	1	0	0	0
Nigeria	0	0	0	0	0	0	0	2	0	0
Uganda	0	0	0	0	0	0	1	0	0	0
Cuba	0	0	2	0	0	0	1	0	0	0
Jamaica	0	0	1	0	0	0	0	0	0	0
Sri Lanka	0	0	0	0	0	0	0	0	0	1
Solomon Islands	0	1	0	0	0	0	0	1	0	0
Puerto Rico	0	2	3	0	0	0	0	0	0	0

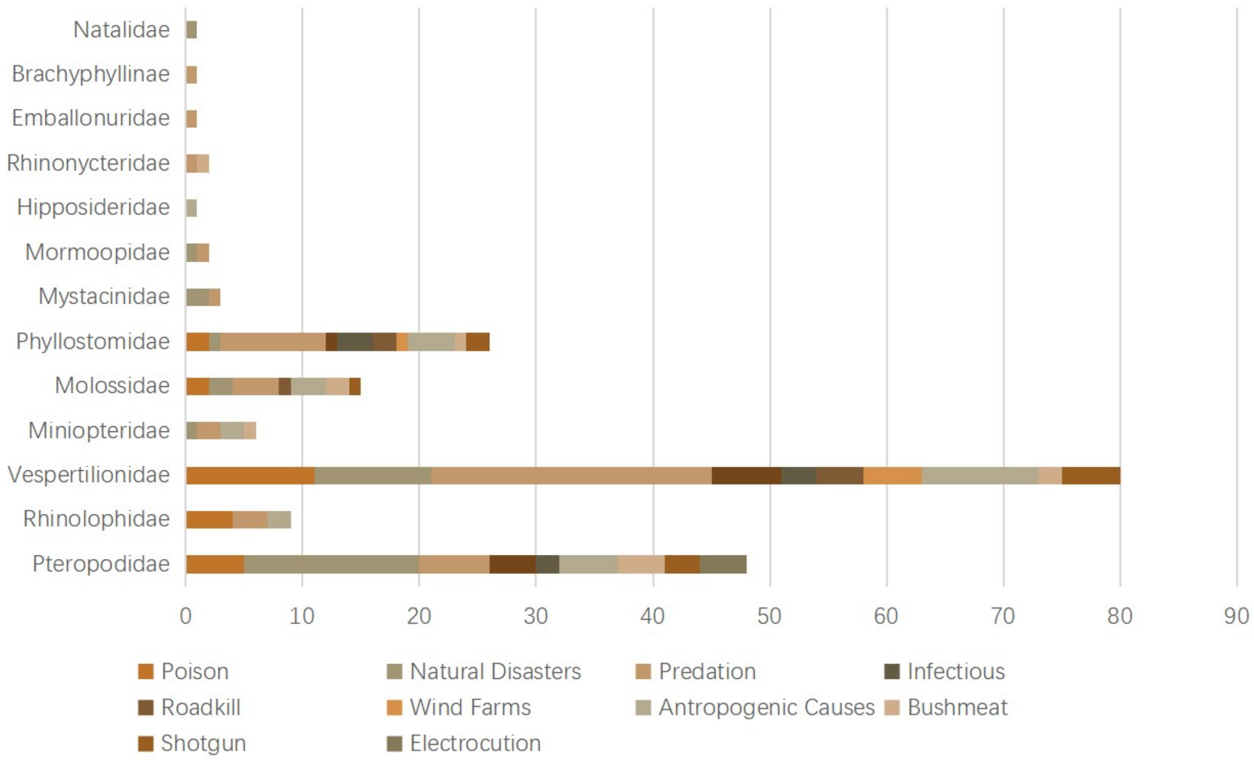

Figure 5. Distribution of the causes of mortality among bats across the different Families.

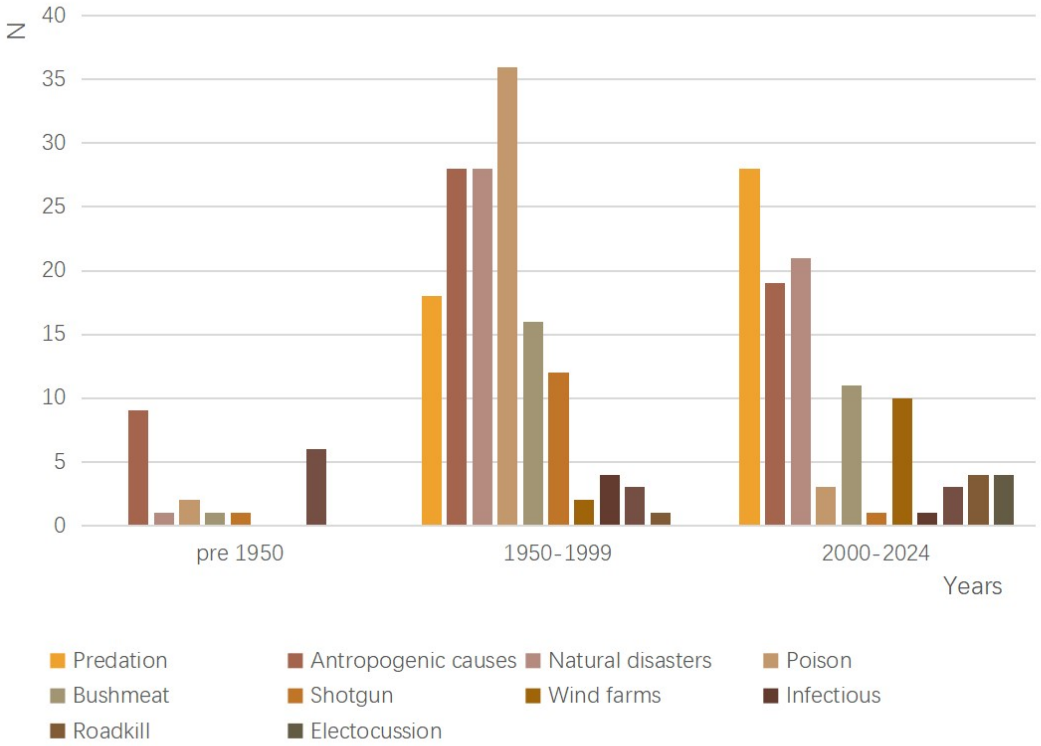

Figure 6. Distribution of the causes of mortality among bats across the years.

Predation is only associated with attacks by domestic animals, such as cats [41,42]. Regarding anthropogenic causes, some events were due to accidents such as entanglement in netting or cave obstruction [22,43]. Other events were associated with vandalism or direct persecution of bats as pests [4]. Infectious diseases were also linked to tick paralysis neurotoxicity [44], rabies [45], EBLV-1 [46], and *Pseudogymnoascus destructans* [34] (see Appendix A -Table A1).

3.4. Post-mortem Findings

In four other papers, which were not included in the previous analysis, focused on the post-mortem examination of animals admitted to centres and laboratories.

Colombino et al. (2013) necropsied a total of 71 bats from the *Vespertilionidae* and *Molossidae* families. Among them, 56.3% showed traumatic injuries, either from unknown trauma (35 bats) or predation (5 bats). The most common lesions were damage to the patagium and skin (32.4%), fractures (21.1%), diaphragmatic hernias (1.4%), and liver petechiae with abdominal haemorrhages (1.4%) [47]. Notably, fractures included radio-ulnar (9.8%), humeral (4.2%), phalangeal (4.2%), and carpal fractures (2.8%) (Figure 6). Thirteen bats (18.3%) died due to severe emaciation, all of which were rescued during the summer. The cause of death could not be determined for 18 bats (25.4%). Additionally, gastric distension was found in 10 bats (14.1%), mainly observed in summer (50%) and autumn (40%). Other findings included pneumonia (4.2%), free nematodes (*Litomosoides* spp.) in the thorax and/or abdomen (5.6%), and spleen discoloration (1.4%) [47].

Figure 7. Examples of fractures and wing membrane wounds in *Pipistrellus pipistrellus* (Author: Andreia Garcês).

Garcês et al. (2017) [48] examined a total of 20 European bats from the family *Vespertilionidae*. External examinations revealed signs of dehydration and emaciation in all bats, with six showing severe emaciation and enteritis. Two bats had small patches of alopecia on their neck and abdomen, and two others were infested with ticks on their neck, head, and thorax [48]. Ten bats had skeletal or skin lesions resulting from mild to severe trauma, including wing membrane wounds (n = 5), ruptures in the wing membranes (n = 10), exposed humeral fractures (n = 2), forelimb phalangeal fractures (n = 2), and forearm fractures (n = 3), often accompanied by subcutaneous hematomas (Figure 7). One bat was suspected of suffering from a cerebral concussion after colliding with a pool wall [48]. Internal examination revealed hemorrhagic pectoral muscles in four bats and pale muscles in two others. Nine bats had congested internal organs, and three had sanguineous fluid in their thoracic and abdominal cavities. In two cases, the liver had a yellowish colour, and one bat had thickened intestines with a whitish colour [48]. Two pregnant females were found, each carrying an advanced fetus. Seven bats had no internal lesions identified due to mummification (n = 2) or autolysis (n = 5) [48].

Beattie et al. (2022) [49] performed postmortem examination in 275 bat cases, the primary causes of death were cat predation (24.0%, n = 66), blunt force trauma (23.0%, n = 64), and emaciation (21.1%, n = 58). Other causes included rabies (7.6%, n = 21), pneumonia (4.0%, n = 11), dehydration (3.3%, n = 9), and dermatitis (2.9%, n = 8). Trauma was often anthropogenic, including collisions with vehicles, walls, and windows, being crushed by garage doors, and direct harm from humans or domestic dogs [49]. Additionally, 5.1% of bats died from other causes (n = 14), such as septicemia (n = 4), drowning (n = 2), necrohemorrhagic colitis (n = 2), fetal mummification (n = 1), placentitis (n = 1), pulmonary edema (n = 1), suffocation (n = 1), systemic thrombosis (n = 1), and transmural intestinal hemorrhage (n = 1). Fungal growth was observed in 20.7% of bats (n = 57), with 63.2% of these showing associated inflammation (n = 36) [49].

Figure 8. Examples of hemorrhage and hematomas in *Pipistrellus pipistrellus* (Author: Andreia Garcês).

Mühldorfer et al. (2011) [50], between 2002 and 2009, in Germany, collected 486 deceased bats from 19 species of the family *Vespertilionidae.* About 39% of the bats showed varying degrees of traumatic injuries. These included lacerations to the wing membranes (n = 78), fractures in the humerus (n = 31), forearm (n = 50), phalanges (n = 26), femur (n = 4), and ribs (n = 5), as well as skull and mandible fractures (n = 4), loss of extremities (n = 10), subcutaneous hematomas (n = 31), and skin abrasions (n = 21) [50]. Additionally, abdominal injuries such as hernia (14), hemothorax (8), and hemoperitoneum caused by spleen rupture (n = 2) were observed in 24 bats. Some bats also showed joint dislocations (elbow, carpal, or knee) and hind leg paralysis (n = 3). In addition to these physical injuries, 16% of the bats had enlarged spleens and/or livers. Furthermore, 10 bats exhibited signs of hemorrhagic (n = 6) or catarrhal (n = 4) enteritis [50].

Many of the papers relating to mortality due to collision with wind turbines also describe the post-mortem findings. Collisions with turbine blades can result in fractures to the bat's wings, ribs, or legs and hernias (inguinal and diaphragmatic). Wing fractures are particularly common due to the fragility of bat wings [14]. Joints may become dislocated, especially in the wings or limbs, from the impact [51]. Subcutaneous bruising is frequently found, indicating blunt trauma and contusions. Internal hemorrhages can also be present, particularly in the thoracic or abdominal cavities [52]. Severe cuts and tears to the wings, head, or body due to direct contact with the turbine blades or other parts of the turbine structure [53,54]. Barotrauma can also occur when bats fly too close to the spinning blades, experiencing a sharp pressure drop that leads to internal injuries. Key findings include: lung damage (pulmonary edema, alveolar rupture), gas embolism, and vessel rupture [55].

Figure 8. Examples of cranial traumatism in a Tadarida teniotis (Author: Andreia Garcês).

4. Discussion

Bats are ecologically significant creatures that contribute to pest control, pollination, and seed dispersal, yet their populations are experiencing alarming declines across the globe [56]. The causes of bat mortality are complex and multifactorial, with both natural and anthropogenic factors playing crucial roles [57]. Understanding these causes is critical for informing conservation efforts aimed at preserving bat populations and, consequently, the ecosystems they support [24,58].

It is important to note that the information available in this review is not completely correct. Data limitations in bat mortality studies are often compounded by significant underreporting and regional biases, which can skew the interpretation of findings and hinder the formulation of effective conservation strategies. Many bat mortality incidents, particularly those occurring in remote or inaccessible areas, go undocumented, resulting in a substantial underestimation of true mortality rates. Additionally, research efforts are frequently concentrated in regions with greater funding or research infrastructure, leading to geographic biases that may overlook critical mortality events in less-studied areas. Such disparities can obscure broader ecological patterns and misrepresent species-level vulnerabilities. Addressing these limitations requires expanding monitoring efforts to underrepresented regions and implementing standardised, systematic data collection protocols. Future research should prioritize longitudinal studies to track mortality trends over time, integrate community-based reporting systems to capture more localized data, and leverage emerging technologies such as remote sensing and bioacoustics to detect mortality events more comprehensively. Also important to refer to a language limitation with papers in languages such as Russian or Chinese, not included. Unfortunately, it is expected that every year, the number of bats that die is probably much higher than what is reported here.

Bat species, such as *Pteropus poliocephalus, Eptesicus fuscus, Myotis lucifugus,* and *Tadarida brasiliensis*, are particularly represented in mortality reports [22,32,59]. This could indicate that certain species are more vulnerable to the aforementioned causes of death, likely due to their life history traits, migration patterns, or habitat preferences [60,61]. Species of the *Vespertilionidae* (n = 147) were the most reported, which was expected since they are the most common group of bats worldwide [60,61]. Bats are vital for ecosystem services, including pollination, seed dispersal, and insect population control. For instance, the decline of *Pteropus* spp., key pollinators in tropical ecosystems, can disrupt plant reproductive success, affecting entire plant communities [56]. Similarly, reductions in insectivorous species such *as Eptesicus fuscus* and *Myotis lucifugus* could result in increased insect populations, influencing agricultural pest control [62]. Linking these ecological roles to ecosystem function theory, the loss of functional diversity among bat species can compromise ecosystem stability and resilience. For example, the spread of white-nose syndrome has led to severe declines in several North American bat populations, with cascading effects on insect populations and agricultural pest management [2].

The geographical spread of bat mortality events indicates that bat populations are under pressure globally, though some regions are more heavily affected than others. North America and Australia account for the highest mortality events, with North America (n = 112) particularly standing out [44,63,64]. The disproportionate number of mortality events in these regions may be due to factors such as higher bat population densities, more extensive studies conducted in these areas, or the presence of higher human infrastructure that increases risk [65].

The major causes of mortality described in the various papers were predation (n = 59), anthropogenic causes (n = 56), and natural disasters (n = 53). Although causes such as poisoning, gunshots, electrocution, or wind farms could also be associated with anthropogenic factors, the authors decided to differentiate when humans were directly responsible for the deaths, either intentionally or unintentionally.

Analysis over time reveals that some mortality factors have risen in frequency and now represent the predominant causes of death (Figure 6). The shifting causes of bat mortality over the decades reflect changing environmental, industrial, and ecological dynamics. Before 1950, anthropogenic causes were prevalent, likely due to habitat destruction, roost disturbance, and indiscriminate killing driven by misconceptions about bats. The mid-20th century (1950–1999) saw a rise in poison-related deaths, coinciding with the widespread use of pesticides and rodenticides, which inadvertently affected non-target species like bats. Post-2000, predation emerged as a dominant cause of mortality, potentially exacerbated by habitat fragmentation that forces bats into more exposed areas, increasing vulnerability to predators. Additionally, the proliferation of wind farms and expanding electrical infrastructure has further heightened risks of collision and electrocution, reflecting the complex interplay between human development and bat habitats.

Predation (n = 59) is the most common cause of mortality, particularly within the *Vespertilionidae* family, the largest bat group [66,67]. This may be due to their small size, which makes them vulnerable to predators, or their roosting habits, which might place them close to predators [68,69]. All predation events are associated with cats [41,70]. Feral and domestic cats are widely recognized as one of the most significant threats to wildlife, especially to small animals like birds, reptiles, and mammals [41,71]. Research shows that cats kill billions of animals each year, with estimates suggesting that they are responsible for the deaths of millions of bats globally [41]. Cats are skilled hunters who can easily prey on bats, especially when these animals are roosting or emerging at dusk [42]. Additionally, young bats or injured bats are particularly susceptible to predation, and cats may prey on them more frequently than healthy adult bats. The impact of cat predation on bat populations is most pronounced in areas where cats are abundant, particularly in urban and suburban environments [72]. Cat predation represents a significant and often underestimated threat to bat survival since it leads to bat population decline, disruption of roosting sites and increased susceptibility to diseases such as white-nose syndrome [42,72]. Predation pressures on bats could be exacerbated by environmental stressors, such as habitat loss, which may lead to increased vulnerability to predators [73,74].

Anthropogenic factors have emerged as a significant driver of bat mortality, accounting for a notable number of deaths across various bat species. The data presented indicate that anthropogenic causes were responsible for 56 mortality events in the studies reviewed [2]. These causes are diverse and include both accidental and intentional human activities, which can have severe consequences for bat populations [43]. One of the primary forms of accidental anthropogenic mortality in bats is entanglement in netting and obstruction of caves. This form of mortality typically occurs when bats become trapped in mist nets or other types of netting used for research or commercial purposes. While mist nets are important tools for capturing bats for study, if not handled carefully or if left in areas where bats are active, they can inadvertently cause significant harm [75]. Bats that get caught in the nets often suffer physical trauma, including broken wings, suffocation, or other injuries that can lead to death [48,76]. Similarly, obstruction of natural roosting sites (such as caves) by human activities can prevent bats from accessing their homes [77]. Caves are crucial for many bat species that use them for hibernation and roosting, and disruptions to these sites, whether through construction, mining, or tourism, can lead to the displacement of bat colonies or direct injury from trapped individuals. For example, bat exclusion devices or poorly planned cave management for tourism may inadvertently harm bats by preventing them from safely roosting or leading to their entrapment [43]. These forms of accidental mortality may seem incidental, but they can have large-scale implications for bat populations, particularly if the disturbance affects roosting sites that are used by large colonies. Over time, such disruptions can lead to population declines if bats are unable to find suitable alternatives for roosting or if the injuries sustained from entanglement or entrapment reduce reproductive success [77]. Beyond accidents, intentional anthropogenic mortality represents a significant threat to bat populations, often due to vandalism or direct persecution [78]. Bats are sometimes perceived by individuals or communities as threats to agriculture or as disease carriers, largely because of associations with illnesses such as rabies or Ebola and misunderstandings of their behavior and ecological roles. Consequently, bats are often deliberately killed, displaced, or harassed [2,75].

Natural disasters were also a leading cause of bat mortality in both the USA and Australia, with 20 recorded deaths each in these regions. The vulnerability of bat populations to natural disasters—such as storms, hurricanes, floods, or wildfires—raises concerns about how climate change could exacerbate these risks [79]. As extreme weather events become more frequent and severe due to climate change, bat populations may face increased mortality [8]. Natural disasters also disrupt critical roosting sites and foraging areas, further compounding the challenges for affected bat species [80]. Climate change is expected to increase the frequency of extreme weather events, including more intense storms, flooding, and heat waves. As a result, bats in some regions may be facing not only the effects of natural disasters but also the cumulative stress of climate-related changes in temperature, food availability, and habitat conditions [8,81].

Infectious diseases such as White Nose Syndrome (WNS), were included since there is the possibility that humans could be responsible for their fast propagation by contaminating several places of hibernation. It is also important to refer to the negative impact of WNS. Although recorded as 1 event, it has been responsible for the mortality of millions of bats [64,81]. This devastating disease affects hibernating bats, caused by the fungus *Pseudogymnoascus destructans*. It primarily impacts bats in North America and has caused significant declines in bat populations, especially among species that hibernate in caves and mines. The fungus grows on the skin of bats, particularly around the nose, ears, and wings, leading to tissue damage, dehydration, and disturbed hibernation [54,82]. As a result, bats may wake prematurely from hibernation, exhausting their fat reserves and often dying from starvation. WNS has contributed to the decline of several bat species, including the already threatened Little Brown Bat and the Northern Long-Eared Bat [83]. Beyond immediate mortality, the broader ecological ramifications of WNS include disrupted insect control dynamics, increased agricultural pest pressures, and altered nutrient cycling in cave ecosystems [12].

The information in the post-mortem only confirmed what was expected, that the major cause of mortality in bats is associated with trauma [48,49,52,84].

Conservation Considerations and Mitigation Strategies

Conserving bat populations requires a comprehensive approach that addresses the various factors contributing to mortality [85]. Conservation strategies can be more effectively prioritised by considering regional differences in bat mortality drivers. For example, wind turbine collisions pose significant threats to migratory species like *Tadarida brasiliensis* in the southwestern United States, while habitat loss due to deforestation critically affects *Pteropus poliocephalus* populations in Australia. Successful mitigation strategies include installing ultrasonic deterrents near wind farms and establishing protected roosting sites in agricultural landscapes. Additionally, economic incentives, such as integrating bat-friendly practices in urban planning and pest management, can promote conservation while providing cost-effective pest control solutions for farmers [86].

One of the most pressing needs for bat conservation is the protection of critical habitats and restoration [87]. Installing bat houses, restoring old structures, or maintaining protected caves can help mitigate habitat loss [87]. This can include the creation of wildlife corridors that connect fragmented habitats, ensuring that bat populations can migrate and forage without encountering human-made obstacles [88]. Urban planning should incorporate green spaces and bat-friendly infrastructure to provide safe roosting areas [89,90].

As wind energy continues to grow, so does the risk to bats from turbine collisions. Incorporating bat-friendly practices into wind farm development is essential. These practices could include adjusting the timing and operation of turbines during peak bat activity periods or setting wind farms away from key bat habitats and migration routes [52]. Additionally, monitoring bat populations around wind farms can help reduce the risk of fatalities [91,92].

The use of harmful pesticides can poison bats, either directly or through the contamination of their food sources [93]. Stricter regulation on pesticide use, as well as the promotion of organic farming practices and bat-friendly pest control methods, can reduce this threat. Educating farmers and landowners on the benefits of bats in controlling insect populations can also help reduce reliance on harmful chemicals [94,95].

Bushmeat hunting remains a significant threat in tropical regions [9]. Conservation efforts need to include education campaigns that highlight the ecological role of bats and the threats posed by overhunting [9]. Additionally, implementing hunting bans, creating alternative livelihoods, and promoting sustainable practices could help reduce hunting pressures on bat populations [96].

Infectious diseases, particularly white-nose syndrome, have devastated bat populations, especially in North America [57]. Disease surveillance and management should be prioritized, and research into disease prevention and treatment for affected species should be increased. Monitoring bat populations for signs of disease and implementing biosecurity measures to limit disease spread are also important components of bat conservation. Ongoing research and management efforts to mitigate WNS include habitat modifications to reduce pathogen spread, the development of biological treatments (e.g., antifungal agents), and increased monitoring of vulnerable bat populations. These initiatives aim to stabilise populations and restore ecological functions, though long-term recovery remains uncertain [81,82,97].

The legal protection of bats is essential for their conservation. Many bat species are legally protected due to their importance in ecosystems and the growing awareness of their vulnerability. Strengthening legal frameworks can help reduce human-induced mortality caused by poaching, vandalism, and habitat destruction. Educating the public about the importance of bats is crucial for conservation [98]. Many people view bats with fear or suspicion, not realizing their crucial role in pest control and pollination [99]. Public engagement can foster more positive attitudes toward bat conservation and encourage practices that protect bat populations, such as installing bat houses, reducing the use of pesticides, and preserving natural habitats [100].

5. Conclusions

Bat mortality from predation, disease, human activities, and environmental hazards threatens bat populations, ecosystem health, and agricultural productivity, as bats provide vital pest control. Effective conservation requires integrated strategies combining habitat protection, mitigation of anthropogenic impacts, disease management, and public awareness. Initiatives like habitat restoration, education campaigns, and coordinated monitoring (e.g., NABat) demonstrate the value of combining research, policy, and engagement to sustain both bats and the benefits they provide to ecosystems and agriculture.

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Appendix A

Table A1. Reports of multiple bat deaths regarding species, Family, date, location, number of deaths (n), description and reference.

Specie	Family	Date	Location	Type Death	Number Deaths (N)	Description	Ref.
Pteropus alecto, Pteropus poliocephalus, Pteropus scapulatus	*Pteropodidae*	1980	Australia	Poison	11	High levels of lead in the tissue	[23]
Rhinolophus ferrumequinum	*Rhinolophidae*	NA	UK	Poison	15	Lindane	[101]
Rhinolophus ferrumequinum	*Rhinolophidae*	1952	UK	Poison	100	Chemical treatment of timbers for wood-boring insect control	[102]
Rhinolophus ferrumequinum	*Rhinolophidae*	1953	UK	Poison	>100	Lindane	[24,103]
Plecotus auritus	*Rhinolophidae*	1962–1972	Netherlands	Poison	300	Pesticides	[104]
Eptesicus serotinus	*Vespertilionidae*	1964	Netherlands	Poison	14	Lindane	[104]
Eptesicus serotinus, Plecotus auritus, Myotis dasycneme, Pipistrellus sp.	*Vespertilionida, Pteropodidae*	1963–1968	Netherlands	Poison	78	Chemical treatment of timbers for wood-boring insects and decay	[25]
Myotis dasycneme	*Vespertilionidae*	1973–1977	Netherlands	Poison	138	Lindane and DDT	[105]
Myotis dasycneme	*Vespertilionidae*	1974–1981	Netherlands	Poison	40–100	Treatment timber with DDT, lindane, PCP	[106]
Rhinolophus ferrumequinum, Pipistrellus pipistrellus, Plecotus auritus, Myotis brandtii, Myotis daubentonii, Myotis mystacinus, Myotis nattereri	*Rhinolophidae, Vespertilionidae*	1982–1987	UK	Poison	23	Treatment of timbers in roosts with dieldrin or lindane	[107]

Rhinolophus ferrumequinum	*Rhinolophidae*	1986	UK	Poison	1500	Dieldrin as wood preservative	[26]
Rhinolophus ferrumequinum	*Rhinolophidae*	1999–2001	France	Poison	169	Lead and pentachlorophenol poisoning	[108]
Mystacina tuberculata	*Mystacinidae*	2009	New Zealand	Poison	115	Secondary poisoning by rodenticide diphacinone	[28]
Myotis grisescens	*Vespertilionidae*	1976	USA	Poison	39	Dieldrin	[59]
Myotis sodalis	*Vespertilionidae*	1976	USA	Poison	NA	Suspected lethal mix of dieldrin and heptachlor	[109]
Myotis grisescens	*Vespertilionidae*	1977	USA	Poison	74	Dieldrin	[110,111]
Myotis grisescens	*Vespertilionidae*	1978	USA	Poison	103	Dieldrin	[112]
Myotis grisescens	*Vespertilionidae*	1980	USA	Poison	18	Dieldrin	[113]
Myotis grisescens	*Vespertilionidae*	1980–1981	USA	Poison	49	Dieldrin	[113]
Myotis grisescens	*Vespertilionidae*	1982	USA	Poison	2	Dieldrin	[114]
Myotis grisescens	*Vespertilionidae*	1986	USA	Poison	1000	DDD and endrin or metabolite concentrations suggestive of organochlorine	[115]
Myotis lucifugus	*Vespertilionidae*	2009	USA	Poison	30	Carbamate	[30]
Pteropus poliocephalus	*Pteropodidae*	1905	Australia	Natural disasters	NA	High ambient temperatures-hyperthermia	[35,116]
Pteropus poliocephalus	*Pteropodidae*	1913	Australia	Natural disasters	NA	High ambient temperatures-hyperthermia	[35,116]
Pteropus scapulatus	*Pteropodidae*	1926–1927	Australia	Natural disasters	NA	Drought-induced migratory stress and starvation.	[116]
Pteropus alecto, Pteropus poliocephalus	*Pteropodidae*	1994	Australia	Natural disasters	1000	High ambient temperatures-hyperthermia	[35]
Pteropus poliocephalus	*Pteropodidae*	1994	Australia	Natural disasters	6000	High ambient temperatures-hyperthermia	[35]
Pteropus poliocephalus	*Pteropodidae*	1998	Australia	Natural disasters	136	High ambient temperatures-hyperthermia, Drought, native food shortage	[117]
Pteropus poliocephalus	*Pteropodidae*	1990	Australia	Natural disasters	29	High ambient temperatures-hyperthermia	[22]
Pteropus alecto, Pteropus poliocephalus	*Pteropodidae*	2000	Australia	Natural disasters	500	High ambient temperatures-hyperthermia	[35]
Pteropus poliocephalus	*Pteropodidae*	2001	Australia	Natural disasters	>2000	High ambient temperatures-hyperthermia, drought, native food shortage	[118]
Pteropus alecto, Pteropus poliocephalus	*Pteropodidae*	2002	Australia	Natural disasters	3679	High ambient temperatures-hyperthermia	[35]
Pteropus poliocephalus	*Pteropodidae*	2003	Australia	Natural disasters	5000	High ambient temperatures-hyperthermia	[35]
Pteropus poliocephalus	*Pteropodidae*	2004	Australia	Natural disasters	8000	High ambient temperatures-hyperthermia	[35]
Pteropus poliocephalus	*Pteropodidae*	2004	Australia	Natural disasters	5000	High ambient temperatures-hyperthermia	[35]
Pteropus alecto, Pteropus poliocephalus	*Pteropodidae*	2005	Australia	Natural disasters	8900	High ambient temperatures-hyperthermia	[35]
Pteropus poliocephalus	*Pteropodidae*	2006	Australia	Natural disasters	4843	High ambient temperatures-hyperthermia	[35]
Pteropus poliocephalus	*Pteropodidae*	2006–2007	Australia	Natural disasters	207	High ambient temperatures-hyperthermia	[35]
Miniopterus schreibersii	*Miniopteridae*	2006	Australia	Natural disasters	300	Cold temperatures	[37]
Pteropus spp.	*Pteropodidae*	2007	Australia	Natural disasters	NA	Cold temperatures	[119]
Pteropus spp	*Pteropodidae*	2012	Australia	Natural disasters	NA	Storm	[119]
Pteropus poliocephalus, Pteropus alecto	*Pteropodidae*	2014	Australia	Natural disasters	100	High ambient temperatures-hyperthermia	[120]
Pteropus spp.	*Pteropodidae*	2015	Australia	Natural disasters	7000	High ambient temperatures-hyperthermia	[121]
Pteropus niger	*Pteropodidae*	1960	Mauritius	Natural disasters	NA	Cyclone carol	[122]
Brachyphylla cavernarum	*Phyllostomidae*	1977	Virgin Islands	Natural disasters	NA	Severe drought	[123]
Pteropus seychellensis	*Pteropodidae*	1977	Comoros Islands	Natural disasters	NA	Vulcano	[122]
Pteropus rodricensis	*Pteropodidae*	1979	Rodriquez Island	Natural disasters	81	Typhoon celine ii	[122]
Mormopterus acetabulosus	*Molossidae*	1980	Mauritius	Natural disasters	3000	Cyclone Hyacinthe, drowning	[122]
Pteropus rayneri, Pteropus tonganus	*Pteropodidae*	1986	Solomon isles	Natural disasters	NA	Cyclone namu	[124]
Stenoderma rufum	*Phyllostomidae*	1989	Puerto Rico	Natural disasters	NA	Hurricane hugo	[125]

Pteropus tonganus, Pteropus samoensis	*Pteropodidae*	1990, 1991	American Samoa	Natural disasters	NA	Hurricane Ofa and Hurricane Val caused bat starvation	[126–128]
Mormoops blainevillei, Monophyllus redmani, Erophylla sezekorni	*Mormoopidae, Phyllostomidae*	1998	Puerto Rico	Natural disasters	NA	Hurricane georges	[129]
Pteropus tonganus	*Pteropodidae*	2001	Tonga	Natural disasters	40–50	Cyclone waka	[130,131]
Tadarida brasiliensis	*Molossidae*	1930	USA	Natural disasters	40	Frozen	[132]
Myotis lucifugus	*Vespertilionidae*	1936	USA	Natural disasters	>100	Cold weather	[133]
Myotis sodalis	*Vespertilionidae*	1937	USA	Natural disasters	300,000	Flood	[134]
Eptesicus fuscus	*Vespertilionidae*	1940	USA	Natural disasters	>100	Winter storm	[135]
Myotis lucifugus, Myotis sodalis	*Vespertilionidae*	1950	USA	Natural disasters	5000	Flood drowned	[136]
Eptesicus fuscus, Myotis lucifugus, Myotis sodalis, Perimyotis subflavus	*Vespertilionidae*	1964	USA	Natural disasters	NA	Flood	[137]
Rousettus leschnaultii, Hipposideros armiger	*Pteropodidae, Hipposideridae*	2013	India	Anthropogenic causes	12,000	Smoke in cave	[138]
Rousettus leschnaultii, Eonycteris spelaea, Hipposideros armiger	*Pteropodidae, Hipposideridae*	2014	India	Bushmeat	7000	Harvest has been ongoing for >150 years according to oral history	[139]
Pteropus poliocephalus	*Pteropodidae*	1890	Australia	Shotgun	200		[140]
Pteropus poliocephalus	*Pteropodidae*	1950	Australia	Shotgun	2000		[140]
Miniopterus schreibersii	*Miniopteridae*	1965	Australia	Anthropogenic causes	200	Found in caves had broken wings	[141]
Pteropus sp.	*Pteropodidae*	1984	Australia	Anthropogenic causes	NA		[142]
Rhinolophus megaphyllus, Taphozous georgianus	*Rhinolophidae, Emballonuridae*	1988	Australia	Anthropogenic causes	NA	Blasting for mine development	[138]
Pteropus poliocephalus	*Pteropodidae*	1988–1993	Australia	Anthropogenic causes	46	Entanglement in netting at fruit orchards	[143]
Pteropus poliocephalus	*Pteropodidae*	1990	Australia	Shotgun	42		[140]
Pteropus poliocephalus	*Pteropodidae*	1990	Australia	Shotgun	70,000		[144]
Pteropus conspicillatus	*Pteropodidae*	2000	Australia	Electrocution	1510		[145]
Pteropus poliocephalus	*Pteropodidae*	2013	Australia	Anthropogenic causes	NA	Stress of roost destruction	[138]
Rhinolophus hipposideros, Myotis myotis, Nyctalus noctula, Miniopterus schreibersii	*Rhinolophidae, Vespertilionida, Miniopteridae*	Unknown	Yugoslavia	Anthropogenic causes	NA	Children with air guns	[101]
Rousettus aegyptiacus	*Pteropodidae*	1933	Cyprus	Anthropogenic causes	5859	Fruit depredation control	[4]
Rousettus aegyptiacus	*Pteropodidae*	1955	Cyprus	Anthropogenic causes	1100	Fruit depredation control	[4]
Pipistrellus pipistrellus	*Vespertilionidae*	1971	UK	Poison	2000	Insecticide fumigation	[101]
Rhinolophus ferrumequinum	*Rhinolophidae*	1978	UK	Anthropogenic causes	35	Fireworks	[101]
Myotis sp.	*Vespertilionidae*	1981	UK	Shotgun	96	Shot with pellets	[101]
Pipistrellus pipistrellus	*Vespertilionidae*	1985	Norway	Poison	NA	Gassed	[101]
Miniopterus schreibersii	*Miniopteridae*	1986	Gibraltar	Anthropogenic causes	5000	Smoked out and killed by youths	[101]
Miniopterus schreibersii	*Miniopteridae*	1986	France	Anthropogenic causes	600	Vandals	[101]
Myotis blythii	*Vespertilionidae*	1987	Malta	Anthropogenic causes	100	Killed by fire lit	[101]
Pteropus tonganus	*Pteropodidae*	1923	Niue Island	Bushmeat	NA	Night's catch	[146]
Pteropus mariannus	*Pteropodidae*	1950	Western Caroline Islands	Bushmeat	NA	Seasonal harvest	[147]
Brachyphylla cavernarum	*Phyllostomidae*	1955	U.S. Virgin Islands	Anthropogenic causes	2500	Motor vehicle exhaust	[148]
Brachyphylla cavernarum	*Phyllostomidae*	1956	U.S. Virgin Islands	Anthropogenic causes	2000	Motor vehicle exhaust	[148]
Macrotus waterhousii	*Phyllostomidae*	1965	Cuba	Anthropogenic causes	323		[149]
Aproteles bulmerae	*Pteropodidae*	1970	New Guinea	Shotgun	NA		[150]
Pteropus seychellensis	*Pteropodidae*	1977	Seychelles	Bushmeat	5	Restaurant	[151]

Pteropus mariannus	*Pteropodidae*	1978–1981	Western Caroline Islands	Bushmeat	7238	Guam as delicacy	[147]
Pteropus alecto	*Pteropodidae*	1982	Indonesia	Bushmeat	100	Hunters	[152]
Pteropus	*Pteropodidae*	1984	Vanuatu	Bushmeat	100	Ceremonies	[153]
Dobsonia moluccensis	*Pteropodidae*	1984–1987	Papua New Guinea	Bushmeat	NA	Food	[150]
Pteropus giganteus	*Pteropodidae*	1986–1987	Maldives	Anthropogenic causes	295	Fruit depredation control	[154]
Pteropus conspicillatus	*Pteropodidae*	1995	Solomon Islands	Bushmeat	1000	Food	[155]
Pteropus sp.	*Pteropodidae*	2001	Tonga	Bushmeat	50	Food following typhoon	[130]
Pteropus mariannus	*Pteropodidae*	2002–2003	Mariana Islands	Bushmeat	638	Food following typhoon	[156]
Miniopterus manavi, Myotis goudoti	*Miniopteridae*	2003	Madagascar	Bushmeat	100	Food	[157]
Pteropus vampyrus	*Pteropodidae*	2003	Borneo	Bushmeat	4500	Hunters	[158]
Hipposideros commersoni	*Hipposideridae*	2004	Madagascar	Anthropogenic causes	25	Roost	[159]
Rousettus madagascariensis	*Pteropodidae*	2004	Madagascar	Anthropogenic causes	90	Roost	[159]
Hipposideros commersoni, Miniopterus gleni, Triaenops rufus	*Hipposideridae, Miniopteridae, Rhinonycteridae*	2005	Madagascar	Bushmeat	2700	Hunter	[157]
Mops midas	*Molossidae*	2005	Madagascar	Bushmeat	NA	Cooked	[160]
Rousettus madagascariensis	*Pteropodidae*	2006	Madagascar	Anthropogenic causes	300	Fruiting season	[161]
Pteropus rufus	*Pteropodidae*	2006	Madagascar	Bushmeat	100	Canopy nets	[162]
Rousettus madagascariensis	*Pteropodidae*	2006	Madagascar	Bushmeat	480	Hunts	[162]
Pteropus dasymallus	*Pteropodidae*	2008	Japan	Anthropogenic causes	100	Nets set	[163]
Pteropus rufus Eidolon dupreanus	*Pteropodidae*	2008	Madagascar	Bushmeat	190	Hunters	[164]
Pteropus vampyrus	*Pteropodidae*	2011	Philippines	Bushmeat	19	One hunter	[165]
Tadarida brasiliensis	*Molossidae*	1908	USA	Anthropogenic causes	NA	Destroyed	[166]
Corynorhinus townsendii	*Vespertilionidae*	1914	USA	Anthropogenic causes	NA	Vandals set fires	[167]
Eptesicus fuscus	*Vespertilionidae*	1940–1941	USA	Anthropogenic causes	NA	Boys holding burning newspapers	[168]
Myotis lucifugus	*Vespertilionidae*	1944	Canada	Anthropogenic causes	NA	Workmen had killed	[169]
Desmodus rotundus	*Phyllostomidae*	1940s–1950s	Mexico	Anthropogenic causes	10,000	Flame throwers	[170]
Myotis yumanensis	*Vespertilionidae*	1950	Mexico	Poison	>100	DDTt	[111]
Myotis grisescens	*Vespertilionidae*	1950	USA	Anthropogenic causes	NA	Torches	[171]
Myotis lucifugus, Myotis sodalis	*Vespertilionidae*	1960	USA	Anthropogenic causes	100	Flames of torches	[172]
Myotis sodalis	*Vespertilionidae*	1960	USA	Anthropogenic causes	NA	Closed hibernaculum	[173]
Myotis sodalis	*Vespertilionidae*	1961	USA	Anthropogenic causes	10,000	Vandals	[173]
Myotis lucifugus	*Vespertilionidae*	1962–1963	Canada	Infectious	146	Rabies	[169]
Eptesicus fuscus	*Vespertilionidae*	1962–1963	USA	Anthropogenic causes	NA	Pellet shot and burning	[174]
Myotis lucifugus	*Vespertilionidae*	1963	USA	Anthropogenic causes	1500	Exterminated	[173]
Myotis grisescens	*Vespertilionidae*	1963–1971	USA	Anthropogenic causes	NA	Human attacks	[171]
Myotis lucifugus	*Vespertilionidae*	1964	USA	Poison	NA	DDT	[173]
Antrozous pallidus	*Vespertilionidae*	1964	USA	Anthropogenic causes	200	Burned	[175]
Myotis sodalis	*Vespertilionidae*	1965	USA	Anthropogenic causes	140	Intentionally blinded by cauterizing eyes	[176]
Myotis lucifugus	*Vespertilionidae*	1968	USA	Poison	650	DDT	[172]
Myotis lucifugus	*Vespertilionidae*	1969	USA	Poison	>100	DDT	[172]
Myotis sodalis	*Vespertilionidae*	1970	USA	Anthropogenic causes	NA	Vandals	[173]
Myotis grisescens	*Vespertilionidae*	1971	USA	Anthropogenic causes	>100	Burning of construction debris	[177]
Myotis grisescens	*Vespertilionidae*	1970–1976	USA	Shotgun	NA	Teenage boys who shot large numbers of bats	[171]
Eptesicus fuscus	*Vespertilionidae*	1972	USA	Poison	NA	Ddt	[111]

Antrozous pallidus	*Vespertilionidae*	1972	USA	Anthropogenic causes	18	Killed by vandals	[109]
Myotis lucifugus, Eptesicus fuscus	*Vespertilionidae*	1973–1975	USA	Poison	>100	DDT and chlordane	[25,59]
Eptesicus fuscus	*Vespertilionidae*	1978	Canada	Poison	8	DDT	[178]
Desmodus rotundus	*Phyllostomidae*	1980	Mexico	Poison	NA	Anticoagulants	[170,179]
Myotis sodalis	*Vespertilionidae*	1987	USA	Shotgun	NA	Pellet holes or crushed	[180]
Eptesicus fuscus	*Vespertilionidae*	1990	USA	Shotgun	19	Shot and beaten	[181]
Tadarida brasiliensis	*Vespertilionidae*	1991	USA	Shotgun	>575	Firearm shells	[138]
Eptesicus fuscus, Antrozous pallidus, Tadarida brasiliensis	*Vespertilionidae*	1994	USA	Shotgun	26	Shotgun	[181]
Myotis sodalis	*Vespertilionidae*	2007	USA	Anthropogenic causes	105	Beaten	[138]
Lasiurus borealis	*Vespertilionidae*	2008	USA	Anthropogenic causes	10	Trauma	[30]
Myotis lucifugus, Eptesicus fuscus	*Vespertilionidae*	2009	USA	Anthropogenic causes	30	Trauma	[30]
Tadarida brasiliensis	*Vespertilionidae*	2010	USA	Shotgun	73	Gunshot	[30]
Myotis yumanensis	*Vespertilionidae*	2012	USA	Anthropogenic causes	14	Trauma	[30]
Myotis austroriparius	*Vespertilionidae*	2013	USA	Anthropogenic causes	41	Trauma	[30]
Myotis lucifugus	*Vespertilionidae*	2013	USA	Anthropogenic causes	12	Trauma	[30]
Myotis lucifugus	*Vespertilionidae*	2013	USA	Anthropogenic causes	16	Trauma	[30]
Tadarida brasiliensis	*Vespertilionidae*	2014	USA	Anthropogenic causes	24	Trauma	[30]
Eptesicus fuscus	*Vespertilionidae*	2014	USA	Anthropogenic causes	15	Trauma	[30]
Tadarida brasiliensis	*Vespertilionidae*	2014	USA	Anthropogenic causes	25	Trauma	[30]
Desmodus rotundus	*Phyllostomidae*	1940	Trinidad	Anthropogenic causes		Flamethrowers, poison gas, dynamite	[170]
Molossus molossus, Molossus rufus	*Molossidae*	1958–1959	Trinidad	Poison	1931	DDT, BHC, chlordane, dieldrin	[182]
Desmodus rotundus	*Phyllostomidae*	1959	Trinidad	Poison	12	Strychnine	[33]
Desmodus rotundus	*Phyllostomidae*	1960	Trinidad	Infectious	30	Rabies control	[33]
Desmodus rotundus	*Phyllostomidae*	1950–1960	Trinidad	Infectious	20,000	Control efforts	[183]
Desmodus rotundus	*Phyllostomidae*	1961	Trinidad	Anthropogenic causes	171	Nets	[33]
Desmodus rotundus	*Phyllostomidae*	1962	Trinidad	Anthropogenic causes	29	Nets	[33]
Desmodus rotundus	*Phyllostomidae*	1950–1990	Brazil	Anthropogenic causes	>100	Poisonous gas and dynamited	[179]
Desmodus rotundus	*Phyllostomidae*	1960	Colombia	Infectious	5000	Aerosolized Newcastle's virus	[170]
Desmodus rotundus	*Phyllostomidae*	1964–1966	Venezuela	Poison	2,700,000	Fumigation	[184]
Eptesicus, Myotis, Perimyotis, Miniopterus, Barbastella, Plecotus and Rhinolophus	*Vespertilionidae, Miniopteridae, Rhinolophidae*	2006–2024	USA, Europe	Infectious	5.7 million	*Pseudogymnoascus destructans*	[97,185]
Rhinonicteris aurantia	*Rhinonycteridae*	2020–2023	Australia	Predation	183–200	Cats	[15]
Tadarida brasiliensis	*Molossidae*	1967	USA	Natural disasters	NA	Drought-induced migratory stress and starvation.	[186]
Myotis grisescens	*Vespertilionidae*	1970	USA	Natural disasters	10,000	Flood	[187]
Tadarida brasiliensis	*Molossidae*	1977	USA	Natural disasters	NA	Rainstorm	[186]
Myotis sodalis	*Vespertilionidae*	1977	USA	Natural disasters	200	Frozen	[188]
Myotis sodalis	*Vespertilionidae*	1950	USA	Natural disasters	NA	Winter storm	[173]
Myotis sodalis	*Vespertilionidae*	1986	USA	Natural disasters	NA	Winter storm[137]	[173]
Myotis austroriparius	*Vespertilionidae*	1989	USA	Natural disasters	6500	Flood	[189]
Myotis austroriparius	*Vespertilionidae*	1990	USA	Natural disasters	5000	Flood	[189]
Myotis austroriparius	*Vespertilionidae*	1994	USA	Natural disasters	85,000	Flood	[190]
Myotis sodalis	*Vespertilionidae*	1996	USA	Natural disasters	100	Flood	[191]

Myotis sp.	*Vespertilionidae*	1997	USA	Natural disasters	10	Flood	[191]
Myotis lucifugus	*Vespertilionidae*	2004	USA	Natural disasters	51	High temperatures	[30]
Eptesicus fuscus Myotis sp.	*Vespertilionidae*	2005	USA	Natural disasters	25	Flood	[191]
Tadarida brasiliensis	*Vespertilionidae*	2011	USA	Natural disasters	600	Winter storm	[30]
Pteropus poliocephalus	*Pteropodidae*	1988–1993	Australia	Natural causes	61	Non-volant young	[143]
Pteropus conspicillatus	*Pteropodidae*	1991	Australia	Infectious	3000	Tick paralysis neurotoxicity (fostered by ecosystem change)	[192]
Pteropus conspicillatus	*Pteropodidae*	1998–2010	Australia	Infectious	680	Tick paralysis	[44]
Rhinolophus ferrumequinum, Rhinolophus hipposideros, Plecotus auritus	*Vespertilionidae, Rhinolophidae*	1988	UK	Predation	22	Cat	[101]
Myotis daubentonii	*Vespertilionidae*	1988	UK	Predation	70	Cat	[101]
Plecotus auritus, Pipistrellus spp.,	*Vespertilionidae*	1997	UK	Predation	30	Cat	[193]
Hypsugo savii	*Vespertilionidae*	2009	Italy	Predation	12	Cat	[42]
Pipistrellus kuhlii	*Vespertilionidae*	2009–2011	Italy	Predation	47	Cat	[42]
Brachyphylla cavernarum, Erophylla bombifrons, Mormoops blainvillei, Monophyllus redmani, Pteronotus quadridens	*Phyllostomidae, Mormoopidae, Pteropodidae*	2006–2007	Puerto Rico	Predation	161	Cat	[194]
Mystacina tuberculata	*Mystacinidae*	2010	New Zealand	Predation	102	Cat	[73]
Myotis sp.	*Vespertilionidae*	1892	USA	Natural causes	12	Burdock plants (*Arctium sp.*)	[195]
Myotis lucifugus	*Vespertilionidae*	1969	USA	Predation	NA	Cat	[196]
Myotis sp., Lasiurus cinereus	*Vespertilionidae*	1985	USA	Poison	1000	Blue-green algal bloom (bluegreen algae neurotoxin identified)	[31]
Myotis lucifugus	*Vespertilionidae*	2008	USA	Predation	10		[30]
Myotis lucifugus	*Vespertilionidae*	2008	USA	Natural causes	40	Emaciation, starvation suspect	[30]
Myotis lucifugus	*Vespertilionidae*	2010	USA	Predation	30		[30]
Eptesicus fuscus	*Vespertilionidae*	2010	USA	Predation	12		[30]
Myotis septentrionalis, Myotis lucifugus	*Vespertilionidae*	2010	USA	Predation	12		[30]
Eptesicus fuscus	*Vespertilionidae*	2011	USA	Predation	13		[30]
Myotis ciliolabrum	*Vespertilionidae*	2011	USA	Natural causes	50	Starvation	[30]
Corynorhinus townsendii	*Vespertilionidae*	2012	USA	Predation	11	Starvation	[30]
Tadarida brasiliensis	*Vespertilionidae*	2014	USA	Predation	123	Starvation	[30]
Hypsugo savii, Nyctalus noctula, Pipistrellus kuhlii, Pipistrellus pipistrellus, Eptesicus serotinus	*Vespertilionidae*	1998–2000	Spain	Wind farms	23		[197]
Pipistrellus spp, Nyctalus leisleri	*Vespertilionidae*	2007	Portugal	Wind farms	48		[198]
Artibeus lituratus, Molossus molossus, Molossus rufus, Nyctinomops laticaudatus, Promops nasutus, Promops nasutus, Lasiurus blossevillii, Lasiurus cinereus, Lasiurus ega	*Phyllostomidae, Molossidae, Vespertilionidae*	2004–2010	Brazil	Wind farms	336		[199]
Tadarida brasiliensis, Myotis yumanensis, Myotis yumanensis, Myotis yumanensis, Tadarida brasiliensis, Myotis spp, Eptesicus fuscus	*Vespertilionidae*	2011–2012	USA	Infectious	28	Rabies	[45]
Lasiurus ega, Myotis ruber, Myotis ruber, Artibeus lituratus, Artibeus fimbriatus, Sturnira lilium	*Phyllostomidae, Vespertilionidae*	2014–2015	Brazil	Roadkill	11		[200]
Myotis myotis	*Vespertilionidae*	2020	Czech Republic	Natural causes	NA		[201]
Eptesicus fuscus, Myotis lucifugus	*Vespertilionidae*	2008–2017	USA	Wind farms	18		[202]
Myotis davidii	*Vespertilionidae*	2014	Mongoli	Anthropogenic causes	1208	Obstruction of the entrance, human activities may have exacerbated a blockage of the cave	[43]

						entrance and are the primary cause of the mortality of bats in the cave.	
Molossops temminckii, Glossophaga soricina, Artibeus spp., Platyrrhinus spp., Sturnira lilium	*Phyllostomidae, Molossidae*	2010–2015	Brazil	roadkill	NA		[203]
Eptesicus fuscus, Myotis lucifugus, Pipistrellus subflavus, Myotis septentrionalis, Lasiurus cinereus, Lasiurus borealis, Lasionycteris noctivagans	*Vespertilionidae*	2008–2009	USA	Wind farms	332		[204],
Myotis austroriparius	*Vespertilionidae*	1971–1972	USA	Natural causes	NA		[205]
Rhinolophus hipposideros, Myotis brandtii, M. alcathoe, M. emarginatus, M. nattereri, M. bechsteinii, M. myotis, M. daubentonii, M. emarginatus/alcathoe, M. emarginatus/alcathoe, Eptesicus serotinus, Nyctalus noctula, N. leisleri, Pipistrelus pipistrellus, P. pygmaeus, P. nathusii, P. pipistrellus/pygmaeus, Pipistrellus sp., Hypsugo savii, Plecotus auritus, P. austriacus, Barbastella barbastellus, P. auritus/austriacus	*Vespertilionidae*	2007	Austria	roadkill	NA		[206]
Lasionycteris noctivagans, Lasiurus cinereus, Myotis lucifugus, Lasiurus borealis, Eptesicus fuscus	*Vespertilionidae*	2008–2010		Wind farms	NA		[207]
Lasionycteris noctivagans, Lasiurus cinereus, Myotis lucifugus, Lasiurus borealis, Eptesicus fuscus	*Vespertilionidae*	2009	USA	Wind farms	41		[207]
Lasiurus cinereus, Lasiurus borealis, Eptisecus fuscus, Lasionycteris noctivagans, Myotis lucifugus	*Vespertilionidae*	2001–2002	Minnesota	Wind farms	151		[208]
Myotis lucifugu	*Vespertilionidae*	1977–1974	USA	Poison	151	DDT, chlordan	[209]
Rhinolophus hipposideros, Myotis myotis, Myotis nattereri, Myotis mystacinus, Myotis brandtii, Myotis dasycneme, Myotis daubentoniia, Eptesicus serotinus, Pipistrellus nathusii, Nyctalus noctula, Nyctalus leisleri, Plecotus auritus, Plecotus austriacus, Barbastella barbastellus	*Vespertilionida, Rhinolophidae*	1994–2000	Poland	Roadkill			[210]
Epomophorus wahlbergi	*Pteropodidae*	2021	South Africa	Natural disasters	NA	High temperatures	[211]
Eptesicus serotinus	*Vespertilionidae*	2009	France	Infectious	200	Eblv-1	[212]
Eptesicus fuscus, Lasionycteris noctivagans, Lasiurus borealis, Myotis velifer, Perimyotis subflavus, Tadarida brasiliensis	*Vespertilionidae*	2004–2005	USA	Wind farms	12		[213]
Chaerephon plicatus, Taphozous theobaldi	*Molossidae, Emballonuridae*	2006	Cambodia	Natural disasters	176	Temple, whose roof had collapsed bad weather	[214]
M. daubentonii , M. nattereri , P. auritus , M. myotis	*Vespertilionidae*	1995–2000	Poland	Natural causes		During the research thirty four dead bats were found.	[215]
Pipistrellus spp., Eptesicus spp., Nyctalus spp., Myotis spp, Miniopterus schreibersii, Tadarida teniotis, Hypsugo savii, Rhinolophus spp., Barbastella barbastellus, Plecotus spp	*Vespertilionida, Miniopteridae, Rhinolophidae*	2005–2009	Spain	Wind farms	2858		[216]

Lasiurus cinereus, Lasiurus borealis, Lasionycteris noctivagans	*Vespertilionidae*	1976–2014	USA	Wind farms	NA		[217]
Madeira pipistrelle	*Vespertilionidae*	2014	Portugal	predation	161	Catt attack	[41]
Mystacina tuberculata	*Mystacinidae*	2012	New Zealand	predation		Catt attack	[73]
Pteropus melanotus	*Pteropodidae*	2012	Christmas island	predation		Catt attack	[145,218]
Artibeus lituratus , Glossophaga soricina , Carollia perspicillata, Platyrrhinus recifinus , Sturnira lilium , Platyrrhinus lineatus , Phyllostomus hastatus , Nyctinomops laticaudatus , Artibeus fimbriatus and Anoura caudifer	*Phyllostomidae, Molossidae*	2008–2019	Brazil	roadkill	923		[219]
Nyctalus leisleri, Pipistrellus pipistrellus/ P. pygmaeus, P. nathusii, Hypsugo savii and N. noctula	*Vespertilionidae*	2009–2010	Greece	Wind farms	81		[220]
Eidolon helvum	*Pteropodidae*	1909	Democratic Republic of the Congo	Anthropogenic causes	NA	Killed by local people	[221]
Eidolon helvum	*Pteropodidae*	1914	Democratic Republic of the Congo	Anthropogenic causes	NA	Dozens of them were killed every day by natives with arrows and nooses	[221]
Neoromicia nana	*Vespertilionidae*	1914	Democratic Republic of the Congo	Anthropogenic causes	NA	Mutilated	[221]
Eidolon helvum	*Pteropodidae*	1972	Nigeria	Bushmeat	10	Killed during hunting for food	[222]
Eidolon helvum	*Pteropodidae*	1972–1973	Nigeria	Bushmeat	12,000	Control and for market	[222]
Hypsignathus monstrosus, Epomops franqueti	*Pteropodidae*	2007	Democratic Republic of Congo	Shotgun	NA	Hunters shoot them on a daily basis	[223]
Rousettus aegyptiacus	*Pteropodidae*	2008	Uganda	Anthropogenic causes	NA	People had contracted Marburg haemorrhagic fever	[224]
Myotis emarginatus, Rhinolophus ferrumequinum	*Vespertilionida, Rhinolophidae*	Unknown	Betan Aharon Nature Reserve, Israel	Poison	NA	Fumigation aimed at fruit bats (Rousettus aegyptiacus) as crop pests	[225]
Cheiromeles torquatus	*Molossidae*	1950	Malaysia	Bushmeat	NA	Food	[226]
Rousettus leschenaultii, Chaerephon plicatus,	*Pteropodidae, Molossidae*	1960	Malaysia	Bushmeat	NA	Food	[226]
Rousettus leschenaultii, Chaerephon plicatus,	*Pteropodidae, Molossidae*	1960	Thailand	Bushmeat	NA	Food	[24]
Pteropus vampyrus, P. hypomelanus	*Pteropodidae*	1983–1984	Malaysia	Bushmeat	NA	Food	[124]
Pteropus vampyrus	*Pteropodidae*	1980	Malaysia	Bushmeat	NA	It is not uncommon for a group of hunters to bag several hundred in a single outing". (1 event)	[124]
Chaerephon plicatus	*Molossidae*	1990	Lao	Bushmeat	NA	Sold at market	[227]
Scotophilus kuhlii	*Vespertilionidae*	1990	Lao	Shotgun	40	Slingshots	[227]
Chaerephon plicatus	*Molossidae*	1999	Lao	Bushmeat	NA	Smoked and sold	[227]
Eonycteris spelaea	*Pteropodidae*	2011	Thailand	Anthropogenic causes	>1000	Nets set for orchard protection	[228]
Pteropus giganteus	*Pteropodidae*	2018	Sri Lanka	Electocussion	300	electrical structures	[229]
Pteropus giganteus	*Pteropodidae*	2012–2013	Andaman Islands	Electocussion	15–30	electrical structures	[230]
Pteropus giganteus	*Pteropodidae*	2017–2018	India	Electocussion	30	electrical structures	[231]
Pipistrellus pygmaeus, Pipistrellus pipistrellus	*Vespertilioninae*	2016–2018	UK	Predation	40	cat	[232]
Nyctalus noctula	*Vespertilioninae*	2014–2015	Ukraine	Predation	157	cat	[233]
Desmodus rotundus	*Phyllostomidae*	1987, 1991	Argentina, Brazil	Predation		cat	[234]
Pipistrellus kuhlii, Hypsugo savii, Tadarida teniotis, Pipistrellus	*Vespertilioninae, Miniopteridae, Rhinolophidae*	2009–2011	Italy	Predation		cat	[42]
Brachyphylla cavernarum, Monophyllus redmani	*Phyllostomidae*	2010	Puerto Rico	predation		cat	[194]
Miniopterus schreibersii	*Miniopteridae*	2014–2017	Italy	predation	NA	cat	[235]
Austronomus australis	*Molossidae*	2015–2017	Australia	predation	NA	cat	[236]

Tadarida brasiliensis	*Molossidae*	1999	Argentina	predation	NA	cat	[237]
Mystacina tuberculata	*Mystacinidae*	1961	New Zeland	predation	NA	cat	[238]
Chilonatalus macer, Natalus primus	*Natalidae*	2017	Cuba	predation	NA	cat	[239]
Artibeus lituratus	*Phyllostomidae*		Brasil	predation	NA	cat	[240]
Desmodus rotundus	*Phyllostomidae*	1971–2021	Brasil	Poison	NA	Warfarin, chlorophacinone, diphacinone and diphenadione	[241]
Myotis lucifugus	*Vespertilionidae*	2005	Canada	Poison	NA	Rodent Trap	[242]
Phyllonycteris poeyi	*Phyllostomidae*	2010	Cuba	predation	NA	cat	[243]
Pteropus ornatus, Pteropus tonganus, Pteropus vetulus	*Pteropodidae*	2011–2016	New Caledonian	predation	NA	cat	[72]
Rousettus aegyptiacus	*Pteropodidae*	2007	Israel	predation	NA	cat	[244]
Syconycteris australis	*Pteropodidae*	2001	Australia	predation	NA	cat	[174]
Myotis vivesi	*Vespertilionidae*	1998	Mexico	predation	NA	cat	[245]
Nyctophilus geoffroyi	*Vespertilionidae*	2007	Australia	predation	NA	cat	[246]
Nyctophilus geoffroyi	*Vespertilionidae*	1984	Australia	predation	NA	cat	[247]
Nyctophilus geoffroyi	*Vespertilionidae*	2018	Australia	predation	NA	cat	[247]
Chalinolobus gouldii	*Vespertilionidae*	1996–1998	Australia	predation	NA	cat	[248]
Pteropus giganteus	*Pteropodidae*	2010	India	Natural disasters	NA	Hot weather	[249]

References

1. The Benefits of Bats: Celebrating the Critical Contributions of Bats on International Bat Appreciation Day. Available online: https://iucn.org/story/202504/benefits-bats-celebrating-critical-contributions-bats-international-bat-appreciation (accessed on 13 May 2025).
2. Frick W.F., Kingston T., Flanders J. A Review of the Major Threats and Challenges to Global Bat Conservation. Annals of the New York Academy of Sciences. 2020, 1469, 5–25. https://doi.org/10.1111/nyas.14045
3. Roach N. 2016. Dolichotis patagonum. The IUCN Red List of Threatened Species 2016: E.T6785A22190337. https://dx.doi.org/10.2305/IUCN.UK.2016-2.RLTS.T6785A22190337.en (accessed on 13 May 2025).
4. Hadjisterkotis E. The Destruction and Conservation of the Egyptian Fruit Bat Rousettus Aegyptiacus in Cyprus: A Historic Review. European Journal of Wildlife Research. 2006, 52, 282–287. https://doi.org/10.1007/s10344-006-0041-7
5. Dosen A., Ostwald M. Prospect and Refuge Theory: Constructing a Critical Definition for Architecture and Design. International Journal of Design in Society. 2013, 6, 9–23. https://doi.org/10.18848/2325-1328/CGP/v06i01/38559
6. Dosen A., Ostwald M. Evidence for Prospect-Refuge Theory: A Meta-Analysis of the Findings of Environmental Preference Research. City, Territory and Architecture. 2016, 3, 4. https://doi.org/10.1186/s40410-016-0033-1
7. Do Linh San E. Time for a Paradigm Shift? Small Carnivores' Sensitivity Highlights the Importance of Monitoring Mid-Rank Predators in Future Global Change Studies. Journal of Animal Ecology. 2024, 93, 126–131. https://doi.org/10.1111/1365-2656.14047
8. Festa F., Ancillotto L., Santini L., Pacifici M., Rocha R., Toshkova N., Amorim F., Benítez-López A., Domer A., Hamidović D., et al. Bat Responses to Climate Change: A Systematic Review. Biological Reviews. 2023, 98, 19–33. https://doi.org/10.1111/brv.12893
9. Mickleburgh S., Waylen K., Racey P. Bats as Bushmeat: A Global Review. Oryx. 2009, 43, 217–234, https://doi.org/10.1017/S0030605308000938.
10. Nanni V., Mammola S., Macías-Hernández N., Castrogiovanni A., Salgado A.L., Lunghi E., Ficetola G.F., Modica C., Alba R., Spiriti M.M., et al. Global Response of Conservationists across Mass Media Likely Constrained Bat Persecution Due to COVID-19. Biological Conservation. 2022, 272, 109591. https://doi.org/10.1016/j.biocon.2022.109591
11. Gagnon M.F., Turner G.G., Scafini M.R., Thomas K.A., Johnson J.S., Overton B.E., Sewall B.J. Long-Term Trends in the Extent of Pseudogymnoascus Destructans Infection in Little Brown Myotis. Biological Conservation. 2025, 302, 110954. https://doi.org/10.1016/j.biocon.2024.110954
12. Frick W.F., Pollock J.F., Hicks A.C., Langwig K.E., Reynolds D.S., Turner G.G., Butchkoski C.M., Kunz T.H. An Emerging Disease Causes Regional Population Collapse of a Common North American Bat Species. Science. 2010, 329, 679–682. https://doi.org/10.1126/science.1188594
13. Holocene Shifts of the Southern Westerlies across the South Atlantic. Available online: https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2014PA002677 (accessed on 13 May 2025).

14. Amorim F., Rebelo H., Rodrigues L. Factors Influencing Bat Activity and Mortality at a Wind Farm in the Mediterranean Region. Acta Chiropterologica. 2012, 14, 439–457. https://doi.org/10.3161/150811012X661756
15. Moyses J., Grabham C., Armstrong K., Knuckey C., D'Rozario B. Feral Cat Predation of the Threatened Pilbara Leaf-Nosed Bat – a Key Threatening Process. Australian Mammalogy. 2024, 46, AM23049. https://doi.org/10.1071/AM23049
16. Fensome A.G., Mathews F. Roads and Bats: A Meta-Analysis and Review of the Evidence on Vehicle Collisions and Barrier Effects. Mammal Review. 2016, 46, 311–323. https://doi.org/10.1111/mam.12072
17. Guest E.E., Stamps B.F., Durish N.D., Hale A.M., Hein C.D., Morton B.P., Weaver S.P., Fritts S.R. An Updated Review of Hypotheses Regarding Bat Attraction to Wind Turbines. Animals. 2022, 12, 343. https://doi.org/10.3390/ani12030343
18. Kelm D., Langheld M., Nogueras J., Popa-Lisseanu A., Ibáñez C. Continuous Low-Intensity Predation by Owls (Strix Aluco) on Bats (Nyctalus Lasiopterus) in Spain and the Potential Effect on Bat Colony Stability. Royal Society Open Science. 2023, 10, 230309. https://doi.org/10.1098/rsos.230309
19. Page M.J., McKenzie J.E., Bossuyt P.M., Boutron I., Hoffmann T.C., Mulrow C.D., Shamseer L., Tetzlaff J.M., Akl E.A., Brennan S.E., et al. The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews. BMJ. 2021, 372, n71. https://doi.org/10.1136/bmj.n71
20. Cognitive Aging and the Hippocampus in Older Adults. Available online: https://pubmed.ncbi.nlm.nih.gov/28008314/ (accessed on 13 May 2025).
21. Pulscher L., Gray R., McQuilty R., Rose K., Welbergen J. Investigation into the Utility of Flying Foxes as Bioindicators for Environmental Metal Pollution Reveals Evidence of Diminished Lead but Significant Cadmium Exposure. Chemosphere. 2020, 254, 126839. https://doi.org/10.1016/j.chemosphere.2020.126839
22. Tidemann C. Life Expectancy, Causes of Death and Movements of the Grey-Headed Flying-Fox (Pteropus Poliocephalus) Inferred from Banding. Acta Chiropterologica. 2012, 13, 419–429. https://doi.org/10.3161/150811011X624901
23. Hariono B., Ng J., Sutton R.H. Lead Concentrations in Tissues of Fruit Bats (Pteropus Sp.) in Urban and Non-Urban Locations. Wildlife Research. 1993, 20, 315–319. https://doi.org/10.1071/wr9930315
24. Stebbings R.E. Why Should Bats Be Protected? A Challenge for Conservation. Biological Journal of the Linnean Society. 1995, 56, 103–118. https://doi.org/10.1111/j.1095-8312.1995.tb01125.x
25. Kunz T.H., Anthony E.L.P., Rumage W.T. Mortality of Little Brown Bats Following Multiple Pesticide Applications. The Journal of Wildlife Management. 1977, 41, 476–483. https://doi.org/10.2307/3800519
26. Stebbings R.E., Griffith F. Distribution and Status of Bats in Europe, 1st ed. Institute of Terrestrial Ecology: Huntingdon, UK, 1986.
27. Bibliography of Prespa Lakes 2015. Available online: https://www.researchgate.net/publication/331320090_Bibliography_of_Prespa_Lakes_2015 (accessed on 13 May 2025).
28. Dennis G.C., Gartrell B.D. Nontarget Mortality of New Zealand Lesser Short-Tailed Bats (Mystacina Tuberculata) Caused by Diphacinone. Journal of Wildlife Diseases. 2015, 51, 177–186. https://doi.org/10.7589/2013-07-160
29. Jones G., Jacobs D., Kunz T., Racey P. Carpe Noctem: The Importance of Bats as Bioindicators. Endangered Species Research. 2009, 8, 93–115. https://doi.org/10.3354/esr00182
30. 2015 | U.S. Geological Survey. Available online: https://www.usgs.gov/centers/community-for-data-integration-%28cdi%29/science/science-topics/2015 (accessed on 28 February 2025).
31. Pybus M.J., Hobson D.P., Onderka D.K. Mass Mortality of Bats Due to Probable Blue-Green Algal Toxicity. Journal of Wildlife Diseases. 1986, 22, 449–450. https://doi.org/10.7589/0090-3558-22.3.449
32. Clark D. DDT and the Decline of Free-Tailed Bats (Tadarida Brasiliensis) at Carlsbad Cavern, New Mexico. Archives of environmental contamination and toxicology. 2001, 40, 537–543. https://doi.org/10.1007/s002440010207
33. Greenhall A.M. Use of Mist Nets and Strychnine for Vampire Control in Trinidad. Journal of Mammalogy. 1963, 44, 396–399. https://doi.org/10.2307/1377208
34. Barlow A.M., Worledge L., Miller H., Drees K.P., Wright P., Foster J.T., Sobek C., Borman A.M., Fraser M. First Confirmation of Pseudogymnoascus Destructans in British Bats and Hibernacula. Veterinary Record. 2015, 177, 73. https://doi.org/10.1136/vr.102923
35. Welbergen J., Klose S., Markus N., Eby P. Climate Change and the Effects of Temperature Extremes on Australian Flying-Foxes. Proceedings of the Royal Society B: Biological sciences. 2007, 275, 419–425. https://doi.org/10.1098/rspb.2007.1385
36. Vardon M., Tidemann C. The Black Flying-Fox (Pteropus Alecto) in North Australia: Juvenile Mortality and Longevity. Australian Journal of Zoology. 2000, 48, 91–97., https://doi.org/10.1071/ZO99060

37. Bourne S., Hamitlon-Smith E. Miniopterus Schreibersii Bassanii and Climate Change. The Australasian Bat Society Newsletter. 2007, 28, 67–69.
38. Swanepoel P., Genoways H. Brachyphylla Cavernarum. Mammalian Species. 1983, 205, 1–6. https://doi.org/10.2307/3503901
39. Pteropus Seychellensis Subsp. Comorensis (Cheke & Dahl, 1981). Available online: https://www.gbif.org/species/222469402/verbatim (accessed on 3 March 2025).
40. Palmeirim J., Champion A., Naikatini A., Niukula J., Tuiwawa M., Fisher M., Qalovaki S., Dunn T. Distribution, Status and Conservation of the Bats of the Fiji Islands. Oryx. 2007, 41, 509–519. https://doi.org/10.1017/S0030605307004036
41. Rocha R. Look What the Cat Dragged in: Felis Silvestris Catus as Predators of Insular Bats and Instance of Predation on the Endangered Pipistrellus Maderensis. Barbastella. 2015, 8, 18–21. http://dx.doi.org/10.14709/BarbJ.8.1.2015.04
42. Ancillotto L., Serangeli M.T., Russo D. Curiosity Killed the Bat: Domestic Cats as Bat Predators. Mammalian Biology. 2013, 78, 369–373. https://doi.org/10.1016/j.mambio.2013.01.003
43. Dalannast M., Hoyt J.R., Byambajav D., Munkhtaivan U., Narantsetseg N., Batbold B.-E., Jargalsaikhan A. Human Impact and Environmental Conditions Lead to a Mass Mortality Event of David's Myotis (Myotis Davidii) in Mongolia. Animal Conservation. 2025, 28, 169–171. https://doi.org/10.1111/acv.12990
44. Buettner P., Westcott D., Maclean J., Brown L., McKeown A., Johnson A., Wilson K., Blair D., Luly J., Skerratt L., et al. Tick Paralysis in Spectacled Flying-Foxes (Pteropus Conspicillatus) in North Queensland, Australia: Impact of a Ground-Dwelling Ectoparasite Finding an Arboreal Host. PloS one. 2013, 8, e73078. https://doi.org/10.1371/journal.pone.0073078
45. Buttke D.E., Grossberg S.B., Reiner D., Verant M.L. Rabies as a Potential Cause of Mass Mortality Events in North American Bat Species. Journal of Wildlife Diseases. 2022, 58, 465–468. https://doi.org/10.7589/JWD-D-21-00159
46. Picard-Meyer E., Servat A., Wasniewski M., Gaillard M., Borel C., Cliquet F. Bat Rabies Surveillance in France: First Report of Unusual Mortality among Serotine Bats. BMC Veterinary Research. 2017, 13, 387. https://doi.org/10.1186/s12917-017-1303-1
47. Colombino E., Lelli D., Canziani S., Quaranta G., Guidetti C., Leopardi S., Robetto S., De Benedictis P., Orusa R., Mauthe Degerfeld M., et al. Main Causes of Death of Free-Ranging Bats in Turin Province (North-Western Italy): Gross and Histological Findings and Emergent Virus Surveillance. BMC Veterinary Research. 2023, 19, 200. https://doi.org/10.1186/s12917-023-03776-0
48. Garcês A., Soeiro V., Lóio S., Pires I. Causes of Morbidity and Mortality of Bats in a Wildlife Recovery Center in Portugal. Barbastella. 2017, 10, 6. https://doi.org/10.14709/BarbJ.10.1.2017.08
49. Beattie I., Schofer D., McGregor G., Lee M.J., Lee L.K.F., Himsworth C.G., Byers K.A. An Investigation of Bat Mortality in British Columbia, Canada. Canadian Journal of Zoology. 2022, 100, 464–473. https://doi.org/10.1139/cjz-2021-0230
50. Mühldorfer K., Speck S., Wibbelt G. Diseases in Free-Ranging Bats from Germany. BMC Veterinary Research. 2011, 7, 61. https://doi.org/10.1186/1746-6148-7-61
51. Barros M., Magalhães R., Rui A. Species Composition and Mortality of Bats at the Osório Wind Farm, Southern Brazil. Studies on Neotropical Fauna and Environment. 2015, 50, 31–39. https://doi.org/10.1080/01650521.2014.1001595
52. Alcalde J.T., Sáenz J. First Data on Bat Mortality in Wind Farms of Navarre (Northern Iberian Peninsula). Le Rhinolophe. 2004, 17, 1–5.
53. Jonasson K., Corcoran A., Dempsey L., Weller T., Clerc T. Bats flying through a Y-maze are visually attracted to wind turbine surfaces. Biology Letters. 2025, 21 (8), 20250242. https://doi.org/10.1098/rsbl.2025.0242
54. Dahl E.L., Bevanger K., Nygård T., Røskaft E., Stokke B.G. Reduced Breeding Success in White-Tailed Eagles at Smøla Windfarm, Western Norway, Is Caused by Mortality and Displacement. Biological Conservation. 2012, 145, 79–85. https://doi.org/10.1016/j.biocon.2011.10.012
55. Farina L.L., Lankton J.S. Chapter 25 - Chiroptera. In: Terio K.A., McAloose D., Leger J.St. (editors). Pathology of Wildlife and Zoo Animals. Academic Press: Cambridge, MA, USA, 2018. pp. 607–633.
56. Kunz T.H., Braun de Torrez E., Bauer D., Lobova T., Fleming T.H. Ecosystem Services Provided by Bats: Ecosystem Services Provided by Bats. Annals of the New York Academy of Sciences. 2011, 1223, 1–38. https://doi.org/10.1111/j.1749-6632.2011.06004.x
57. Russell R.E., Thogmartin W.E., Erickson R.A., Szymanski J., Tinsley K. Estimating the Short-Term Recovery Potential of Little Brown Bats in the Eastern United States in the Face of White-Nose Syndrome. Ecological Modelling. 2015, 314, 111–117. https://doi.org/10.1016/j.ecolmodel.2015.07.016

58. Twente Jr J.W. Aspects of a Population Study of Cavern-Dwelling Bats. Journal of Mammalogy. 1955, 36, 379–390. https://doi.org/10.2307/1375680
59. Clark D.R., LaVal R.K., Swineford D.M. Dieldrin-Induced Mortality in an Endangered Species, the Gray Bat (Myotis Grisescens). Science. 1978, 199, 1357–1359. https://doi.org/10.1126/science.564550
60. Fenton B., Simmons N. Bats: A World of Science and Mystery. The University of Chicago Press: Chicago, IL, USA, 2015. https://doi.org/10.7208/9780226065267
61. Kunz T.H., Fenton B. Bat Ecology. The University of Chicago Press: Chicago, IL, USA, 2005.
62. Boyles J., Cryan P., Mccracken G., Kunz T. Economic Importance of Bats in Agriculture. Science. 2011, 332, 41–42. https://doi.org/10.1126/science.1201366
63. Goodpaster W., Hoffmeister D.F. Bats as Prey for Mink in Kentucky Cave. Journal of Mammalogy. 1950, 31, 457. https://doi.org/10.1093/jmammal/31.4.457
64. Lorch J.M., Palmer J.M., Lindner D.L., Ballmann A.E., George K.G., Griffin K., Knowles S., Huckabee J.R., Haman K.H., Anderson C.D., et al. First Detection of Bat White-Nose Syndrome in Western North America. mSphere. 2016, 1, e00148-16. https://doi.org/10.1128/mSphere.00148-16
65. Russo D., Ancillotto L. Sensitivity of Bats to Urbanization: A Review. Mammalian Biology. 2015, 80, 205–212. https://doi.org/10.1016/j.mambio.2014.10.003
66. Martinez S., Lee T. Predation on Mexican Free-Tailed Bats (Tadarida Brasiliensis) By Merlin (Falco Columbarius). The Southwestern Naturalist. 2013, 58, 508–512. https://doi.org/10.1894/0038-4909-58.4.508
67. Hoetker G., Gobalet K. Predation on Mexican Free-Tailed Bats by Burrowing Owls in California. Journal of Raptor Research. 2024, 33, 11.
68. Dwyer P. Fox Predation on Cave Bats. The Australian journal of science. 1964, 26, 397–398.
69. Rodriguez-Duran A., Lewis A. Seasonal Predation by Merlins on Sooty Mustached Bats in Western Puerto Rico. Biotropica. 1985, 17, 71. https://doi.org/10.2307/2388382
70. Hammer M., Arlettaz R. A Case of Snake Predation upon Bats in Northern Morocco: Some Implications for Designing Bat Grilles. Journal of Zoology. 1998, 245, 211–212. https://doi.org/10.1111/j.1469-7998.1998.tb00090.x
71. Churcher P.B., Lawton J.H. Predation by Domestic Cats in an English Village. Journal of Zoology. 1987, 212, 439–455. https://doi.org/10.1111/j.1469-7998.1987.tb02915.x
72. Oedin M., Brescia F., Millon A., Murphy B.P., Palmas P., Woinarski J.C.Z., Vidal E. Cats Felis Catus as a Threat to Bats Worldwide: A Review of the Evidence. Mammal Review. 2021, 51, 323–337. https://doi.org/10.1111/mam.12240
73. Scrimgeour J., Beath A., Swanney M. Cat Predation of Short-Tailed Bats (Mystacina Tuberculata Rhyocobia) in Rangataua Forest, Mount Ruapehu, Central North Island, New Zealand. New Zealand Journal of Zoology. 2012, 39, 257–260. https://doi.org/10.1080/03014223.2011.649770
74. Lima S.L., O’Keefe J.M. Do Predators Influence the Behaviour of Bats? Biological Reviews. 2013, 88, 626–644. https://doi.org/10.1111/brv.12021
75. O’Shea T.J., Cryan P.M., Hayman D.T.S., Plowright R.K., Streicker D.G. Multiple Mortality Events in Bats: A Global Review. Mammal Review. 2016, 46, 175–190. https://doi.org/10.1111/mam.12064
76. Ancillotto L., Cosentino F., Festa F., Mori E. Adhesive Traps for Suppressing Pest Insects Represent a Serious Threat to Bats across Europe. European Journal of Wildlife Research. 2024, 70, 119. https://doi.org/10.1007/s10344-024-01872-6
77. Davy C.M., Banerjee A., Korine C., Guy C., Mubareka S. Urban Bats, Public Health, and Human-Wildlife Conflict. In: Moretto L., Coleman J.L., Davy C.M., Fenton M.B., Korine C., Patriquin K.J. (editors). Urban Bats: Biology, Ecology, and Human Dimensions. Springer International Publishing: Cham, Switzerland, 2022. pp. 153–166.
78. Yusefi G.H., Brito J.C., Soofi M., Safi K. Hunting and Persecution Drive Mammal Declines in Iran. Scientific Report. 2022, 12, 17743. https://doi.org/10.1038/s41598-022-22238-5
79. Reusch C., Gampe J., Scheuerlein A., Meier F., Grosche L., Kerth G. Differences in Seasonal Survival Suggest Species-Specific Reactions to Climate Change in Two Sympatric Bat Species. Ecology and Evolution. 2019, 9, 7957–7965. https://doi.org/10.1002/ece3.5292
80. Martin Bideguren G., López-Baucells A., Puig-Montserrat X., Mas M., Porres X., Flaquer C. Bat Boxes and Climate Change: Testing the Risk of over-Heating in the Mediterranean Region. Biodiversity and Conservation. 2019, 28, 21–35. https://doi.org/10.1007/s10531-018-1634-7

81. McClure M.L., Hranac C.R., Haase C.G., McGinnis S., Dickson B.G., Hayman D.T.S., McGuire L.P., Lausen C.L., Plowright R.K., Fuller N., et al. Projecting the Compound Effects of Climate Change and White-Nose Syndrome on North American Bat Species. Climate Change Ecology. 2022, 3, 100047. https://doi.org/10.1016/j.ecochg.2021.100047
82. Blehert D.S. Fungal Disease and the Developing Story of Bat White-Nose Syndrome. PLOS Pathogens. 2012, 8, e1002779. https://doi.org/10.1371/journal.ppat.1002779
83. Fritze M., Puechmaille S.J. Identifying Unusual Mortality Events in Bats: A Baseline for Bat Hibernation Monitoring and White-Nose Syndrome Research. Mammal Review. 2018, 48, 224–228. https://doi.org/10.1111/mam.12122
84. de Lucas M., Ferrer M., Bechard M.J., Muñoz A.R. Griffon Vulture Mortality at Wind Farms in Southern Spain: Distribution of Fatalities and Active Mitigation Measures. Biological Conservation. 2012, 147, 184–189. https://doi.org/10.1016/j.biocon.2011.12.029
85. Racey P.A. Bat Conservation: Past, Present and Future. In: Adams R.A., Pedersen S.C. (editors). Bat Evolution, Ecology, and Conservation. Springer: New York, NY, USA, 2013. pp. 517–532. https://doi.org/10.1007/978-1-4614-7397-8_25
86. Loeb S.C., Winters E.A. Indiana Bat Summer Maternity Distribution: Effects of Current and Future Climates. Ecology and Evolution. 2013, 3, 103–114. https://doi.org/10.1002/ece3.440
87. Laurindo R.S., Novaes R.L.M., Vizentin-Bugoni J., Gregorin R. The Effects of Habitat Loss on Bat-Fruit Networks. Biodiversity and Conservation. 2019, 28, 589–601. https://doi.org/10.1007/s10531-018-1676-x
88. Patriquin K.J., Moretto L., Fenton M.B. The Big Picture and Future Directions for Urban Bat Conservation and Research. In: Moretto L., Coleman J.L., Davy C.M., Fenton M.B., Korine C., Patriquin K.J. (editors). Urban Bats: Biology, Ecology, and Human Dimensions. Springer International Publishing: Cham, Switzerland, 2022. pp. 181–188.
89. Rueegger N. Bat Boxes — a Review of Their Use and Application, Past, Present and Future. Acta Chiropterologica. 2016, 18, 279–299. https://doi.org/10.3161/15081109ACC2016.18.1.017
90. Gehrt S.D., Chelsvig J.E. Species-Specific Patterns of Bat Activity in an Urban Landscape. Ecological Applications. 2004, 14, 625–635. https://doi.org/10.1890/03-5013
91. Georgiakakis P., Kret E., Cárcamo B., Doutau B., Kafkaletou Diez A., Vasilakis D., Papadatou E. Bat Fatalities at Wind Farms in North-Eastern Greece. Acta Chiropterologica. 2012, 14, 459–468. https://doi.org/10.3161/150811012X661765
92. Salguero Pérez M.D.M., de la Cruz A., Muñoz A.-R., Munoz Arroyo G. Bat Mortality in Wind Farms of Southern Europe: Temporal Patterns and Implications in the Current Context of Climate Change. Biodiversity and Conservation. 2023, 32, 3953–3971. https://doi.org/10.1007/s10531-023-02674-z
93. Torquetti C.G., Guimarães A.T.B., Soto-Blanco B. Exposure to Pesticides in Bats. Science of The Total Environment. 2021, 755, 142509. https://doi.org/10.1016/j.scitotenv.2020.142509
94. Oliveira J.M., Destro A.L.F., Freitas M.B., Oliveira L.L. How Do Pesticides Affect Bats? – A Brief Review of Recent Publications. Brazilian Journal of Biology. 2020, 81, 499–507. https://doi.org/10.1590/1519-6984.225330
95. Bayat S., Geiser F., Kristiansen P., Wilson S.C. Organic Contaminants in Bats: Trends and New Issues. Environment International. 2014, 63, 40–52. https://doi.org/10.1016/j.envint.2013.10.009
96. Kamins A.O., Restif O., Ntiamoa-Baidu Y., Suu-Ire R., Hayman D.T.S., Cunningham A.A., Wood J.L.N., Rowcliffe J.M. Uncovering the Fruit Bat Bushmeat Commodity Chain and the True Extent of Fruit Bat Hunting in Ghana, West Africa. Biological Conservation. 2011, 144, 3000–3008. https://doi.org/10.1016/j.biocon.2011.09.003
97. Blehert D.S., Hicks A.C., Behr M., Meteyer C.U., Berlowski-Zier B.M., Buckles E.L., Coleman J.T.H., Darling S.R., Gargas A., Niver R., et al. Bat White-Nose Syndrome: An Emerging Fungal Pathogen? Science. 2009, 323, 227. https://doi.org/10.1126/science.1163874
98. Medellin R.A., Wiederholt R., Lopez-Hoffman L. Conservation Relevance of Bat Caves for Biodiversity and Ecosystem Services. Biological Conservation. 2017, 211, 45–50. https://doi.org/10.1016/j.biocon.2017.01.012
99. Richardson S.M., Lintott P.R., Hosken D.J., Mathews F. An Evidence-Based Approach to Specifying Survey Effort in Ecological Assessments of Bat Activity. Biological Conservation. 2019, 231, 98–102. https://doi.org/10.1016/j.biocon.2018.12.014
100. Living Safely with Bats: Lessons in Developing and Sharing a Global One Health Educational Resource | Global Health: Science and Practice. Available online: https://www.ghspjournal.org/content/10/6/e2200106 (accessed on 4 March 2025).
101. Stebbings R.E. The Conservation of European Bats. Christopher Helm: London, UK, 1988.
102. Stebbings R.E. Bats, Their Life and Conservation. Quarterly Journal Devon Trust for Nature Conservation. 1971, 3, 29–36.

103. Ransome R.D. Population Changes of Greater Horseshoe Bats Studied near Bristol over the Past Twenty-Six Years. Biological Journal of the Linnean Society. 1989, 38, 71–82. https://doi.org/10.1111/j.1095-8312.1989.tb01564.x
104. Braaksma S. Some Details about the Occurrence of Bats in Summer and Winter-Resorts in The Netherlands and about the Risks Caused by Wood Preservation Activities in Buildings. Periodicum Biologorum. 1973, 75, 125–128.
105. Voûte A. The Pond Bat (Myotis Dasycneme Boie, 1825) an Endangered Bat Species in Northwestern Europe. In: Proceedings of the Fifth International Bat Research Conference. Texas Tech Press: Lubbock, TX, USA, 1980. pp. 185–192.
106. Leeuwangh P., Voûte A.M. Bats and Woodpreservatives. Pesticide Residues in the Dutch Pond Bat (Myotis Dasycneme) and Its Implications. Mammalia. 1985, 49, 517–524. https://doi.org/10.1515/mamm.1985.49.4.517
107. Mitchell-Jones T., Cooke A., Boyd I., Stebbings R. Bats and Remedial Timber Treatment Chemicals a Review. Mammal Review. 1989, 19, 93–110. https://doi.org/10.1111/j.1365-2907.1989.tb00405.x
108. Gremillet X., Boireau J. Intoxication mortelle par le plomb et par le fongicide P.C.P. des juvéniles dans un gîte de parturition de Grands rhinolophes Rhinolophus ferrumequinum dans le Finistère: difficultés du diagnostic et réalisation d’un gîte alternatif. Symbioses. 2004, 10, 59–61.
109. O’Shea T., Clark D. An Overview of Contaminants and Bats, with Special Reference to Insecticides and the Indiana Bat. In: The Indiana Bat: Biology and Management of An Endangered Species. Bat Conservation International, Austin, TX, USA, 2002. pp. 237–253.
110. Secord A.L., Patnode K.A., Carter C., Redman E., Gefell D.J., Major A.R., Sparks D.W. Contaminants of Emerging Concern in Bats from the Northeastern United States. Archives of Environmental Contamination and Toxicology. 2015, 69, 411–421. https://doi.org/10.1007/s00244-015-0196-x
111. Clark D.R., LaVal R.K., Krynitsky A.J. Dieldrin and Heptachlor Residues in Dead Gray Bats, Franklin County, Missouri--1976 versus 1977. Pesticides Monitoring Journal. 1980, 13, 137–140.
112. Clark D.R. Jr., Bunck C.M., Cromartie E., Laval R.K. Year and Age Effects on Residues of Dieldrin and Heptachlor in Dead Gray Bats, Franklin County, Missouri—1976, 1977, and 1978. Environmental Toxicology and Chemistry. 1983, 2, 387–393. https://doi.org/10.1002/etc.5620020403
113. Clark D.R., Clawson R.L., Stafford C.J. Gray Bats Killed by Dieldrin at Two Additional Missouri Caves: Aquatic Macroinvertebrates Found Dead. Bulletin of Environmental Contamination and Toxicology. 1983, 30, 214–218. https://doi.org/10.1007/BF01610123
114. Clawson R.L., Clark D.R. Pesticide Contamination of Endangered Gray Bats and Their Food Base in Boone County, Missouri, 1982. Bulletin of Environmental Contamination and Toxicology. 1989, 42, 431–437. https://doi.org/10.1007/BF01699972
115. Clark D.R., Bagley F.M., Waynon Johnson W. Northern Alabama Colonies of the Endangered Grey Bat Myotis Grisescens: Organochlorine Contamination and Mortality. Biological Conservation. 1988, 43, 213–225. https://doi.org/10.1016/0006-3207(88)90114-0
116. Ratcliffe F. Notes on the Fruit Bats (Pteropus Spp.) of Australia. Journal of Animal Ecology. 1932, 1, 32–57. https://doi.org/10.2307/993
117. Markus N., Hall L. Foraging Behaviour of the Black Flying-Fox (Pteropus Alecto) in the Urban Landscape of Brisbane, Queensland. Wildlife Research. 2004, 31, 345–355. https://doi.org/10.1071/WR01117
118. Mcllwee A., Martin L. On the Intrinsic Capacity for Increase of Australian Flying-Foxes (Pteropus Spp., Megachiroptera). Australian Zoologist. 2012, 32, 76–100. https://doi.org/10.7882/AZ.2002.008
119. Bat Recovery Project - Te Hoiere Project. Available online: https://www.tehoiere.org.nz/about/catchment-actions/bat (accessed on 5 March 2025).
120. Intense Heat Wave in Australia Literally Cooks 100,000 Bats. Available online: https://www.dailymail.co.uk/news/article-2536073/As-U-S-freezes-UK-lies-flood-water-intense-heat-wave-Australia-literally-cooks-100-000-bats.html (accessed on 5 March 2025).
121. Godfrey M. Heatwave Hell as 5000 Dead Bats Drop from Trees in Casino, Northern NSW. Daily Telegraph: Sydney, Australia, 2014.
122. Cheke A., DAHL J. The Status of Bats on Western Indian Ocean Islands, with Special Reference to Pteropus. Mammalia. 1981, 45, 205–238. https://doi.org/10.1515/mamm.1981.45.2.205
123. American Society of Mammalogists. Ten-Year Index to Journal of Mammalogy (1960-1969). Journal of Mammalogy. 1969, 50, 1–109.

124. Fujita M.S., Tuttle M.D. Flying Foxes (Chiroptera: Pteropodidae): Threatened Animals of Key Ecological and Economic Importance. Conservation Biology. 1991, 5, 455–463. https://doi.org/10.1111/j.1523-1739.1991.tb00352.x
125. Gannon M.R., Willig M.R. The Effects of Hurricane Hugo on Bats of the Luquillo Experimental Forest of Puerto Rico. Biotropica. 1994, 26, 320–331. https://doi.org/10.2307/2388854
126. Craig P., Trail P., Morrell T.E. The Decline of Fruit Bats in American Samoa Due to Hurricanes and Overhunting. Biological Conservation. 1994, 69, 261–266. https://doi.org/10.1016/0006-3207(94)90425-1
127. Pierson E.D., Elmqvist T., Rainey W.E., Cox P.A. Effects of Tropical Cyclonic Storms on Flying Fox Populations on the South Pacific Islands of Samoa. Conservation Biology. 1996, 10, 438–451. https://doi.org/10.1046/j.1523-1739.1996.10020438.x
128. Grant G.S., Craig P., Trail P. Cyclone-Induced Shift in Foraging Behavior in Flying Foxes in American Samoa. Biotropica. 1997, 29, 224–228. https://doi.org/10.1111/j.1744-7429.1997.tb00027.x
129. Rodríguez-Durán A. Bat Assemblages in the West Indies: The Role of Caves. In: Fleming, T.H., Racey, P.A. (editors). Island Bats: Evolution, Ecology, and Conservation. University of Chicago Press: Chicago, IL, USA, 2010. pp. 265–280.
130. McConkey K.R., Drake D.R., Franklin J., Tonga F. Effects of Cyclone Waka on Flying Foxes (Pteropus Tonganus) in the Vava'u Islands of Tonga. Journal of Tropical Ecology. 2004, 20, 555–561. https://doi.org/10.1017/S0266467404001804
131. Wiles G., Brooke A. Conservation Threats to Bats in the Tropical Pacific Islands and Insular Southeast Asia. In: Fleming, T.H., Racey, P.A. (editors). Island Bats: Evolution, Ecology, and Conservation. University of Chicago Press: Chicago, IL, USA, 2010. pp. 405–459.
132. Campbell B. Bats on the Colorado Desert. Journal of Mammalogy. 1931, 12, 430. https://doi.org/10.1093/jmammal/12.4.430
133. Norquay K., Martinez-Nuñez F., Dubois J., Monson K., Willis C. Long-Distance Movements of Little Brown Bats (Myotis Lucifugus). Journal of Mammalogy. 2013, 94, 506–515. https://doi.org/10.2307/23488381
134. A Life History and Taxonomic Study of the Indiana Bat, Myotis Sodalis. - ProQuest. Available online: https://www.proquest.com/openview/82416055d79b4b960ab8e81550f6e5af/1?pq-origsite=gscholar&cbl=18750&diss=y (accessed on 6 March 2025).
135. Rysgaard G.N. Bats Killed by Severe Storm. Journal of Mammalogy. 1941, 22, 452–453. https://doi.org/10.1093/jmammal/22.4.452-b
136. Furman A., Özgül A. The Distribution of Cave-Dwelling Bats and Conservation Status of Underground Habitats in Northwestern Turkey. Biological Conservation. 2004, 120, 243–248. https://doi.org/10.1016/j.biocon.2004.02.019
137. DeBlase A.F., Humphrey S.R., Drury K.S. Cave Flooding and Mortality in Bats in Wind Cave, Kentucky. Journal of Mammalogy. 1965, 46, 96. https://doi.org/10.2307/1377821
138. Anonymous Killing Bats Leads to Jail. Bats. 28.
139. Dovih P. Can Traditional Bat Hunts Cause Disease Outbreaks in India? Economic and Political Weekly. 2015, 50, 13–16.
140. West C. Contemporary Issues in Managing Flying-Fox Camps: A Publicly-Documented Conflict from Maclean on the North Coast of NSW. In: Eby P. and Lunney D. (editors). Managing the Grey-headed Flying-fox as a Threatened Species in New South Wales'. Royal Zoological Society of New South Wales: Mosman, Australia, 2002. pp. 176–195. https://doi.org/10.7882/FS.2002.051
141. Holz P., Stent A., Lumsden L., Hufschmid J. Trauma Found to be a Significant Cause of Death in a Pathological Investigation of Bent-winged Bats (Miniopterus Orianae). Journal of Zoo and Wildlife Medicine. 2020, 50, 966–971. https://doi.org/10.1638/2018-0176
142. Bat Conservation International / Ending Bat Extinctions Worldwide. Available online: https://www.batcon.org/ (accessed on 6 March 2025).
143. Tidemann C. Biology and Management of the Grey-Headed Flying-Fox, Pteropus Poliocephalus. Acta Chiropterologica. 1999.
144. Conservation and Sustainable Use of Wildlife. Available online: https://www.env.go.jp/nature/kisho/kisei/en/conservation/ (accessed on 6 March 2025).
145. Martin L. Is the Fruit You Eat Flying-Fox Friendly? The Effects of Orchard Electrocution Grids on Australian Flying-Foxes (Pteropus Spp., Megachiroptera). The Biology and Conservation of Australasian Bats. 2011, 380–389. https://doi.org/10.7882/FS.2011.039
146. History and Traditions of Niue. Available online: https://hdl.handle.net/2027/uc1.b3125088?urlappend=%3Bseq=9 (accessed on 6 March 2025).

147. Falanruw M.V.C. On the Status, Reproductive Biology and Management of Fruit Bats of Yap, Micronesia. Micronesica. 1988, 21, 39–51.
148. Bond R.M., Seaman G.A. Notes on a Colony of Brachyphylla Cavernarum. Journal of Mammalogy. 1958, 39, 150–151. https://doi.org/10.2307/1376623
149. Silva T. Los Murciélagos de Cuba. Academia de Ciencias de Cuba: Habana, Cuba, 1979.
150. Flannery T.F., Seri L. The Mammals of Southern West Sepik Province, Papua New Guinea: Their Distribution, Abundance, Human Use and Zoogeography. Records of the Australian Museum. 1990, 42, 173–208. https://doi.org/10.3853/j.0067-1975.42.1990.114
151. Racey P.A. Two Bats in the Seychelles. Oryx. 1979, 15, 148–152. https://doi.org/10.1017/S0030605300024248
152. Bergmans W., Rozendaal F.G. Notes on Collections of Fruit Bats from Sulawesi and Some Off-Lying Islands (Mammalia, Megachiroptera). Zoologische Verhandelingen. 1988, 248, 1–74.
153. Chambers M., Esrom D. The Fruit Bats of Vanuatu. Bat News. 1991, 20, 4–5.
154. Dolbeer R.A., Fiedler L.A., Rasheed H. Management of Fruit Bat and Rat Populations in the Maldive Islands, Indian Ocean. In: Proceedings of the Vertebrate Pest Conference; 1–3, March, 1988; Monterey, CA, USA.
155. Monkey Faced Bat from the Solomon Islands. Available online: https://australian.museum/learn/animals/mammals/mammology-collection-monkey-faced-bat-from-the-solomon-islands/ (accessed on 5 March 2025).
156. Esselstyn J., Amar A., Janeke D. Impact of Post-Typhoon Hunting on Mariana Fruit Bats (Pteropus Mariannus)1. Pacific Science. 2009, 60, 531–539. https://doi.org/10.1353/psc.2006.0027
157. Goodman S.M. Hunting of Microchiroptera in South-Western Madagascar. Oryx. 2006, 40, 225–228. https://doi.org/10.1017/S0030605306000354.
158. Struebig M.J., Harrison M.E., Cheyne S.M., Limin S.H. Intensive Hunting of Large Flying Foxes Pteropus Vampyrus Natunae in Central Kalimantan, Indonesian Borneo. Oryx. 2007, 41, 390–393. https://doi.org/10.1017/S0030605307000310
159. Cardiff S., Ratrimomanarivo F., Rembert G., Goodman S. Hunting, Disturbance and Roost Persistence of Bats in Caves at Ankarana, Northern Madagascar. African Journal of Ecology. 2009, 47, 640–649. https://doi.org/10.1111/j.1365-2028.2008.01015.x
160. Goodman S., Ratrimomanarivo F., Ranivo J., Cardiff S. The Hunting of Microchiropteran Bats in Different Portions of Madagascar. African Bat Conservation News. 2008, 16, 4–7.
161. Andrianaivoarivelo A.R., Ramilijaona O., Racey P., Razafindrakoto N., Jenkins R. Feeding Ecology, Habitat Use and Reproduction of Rousettus Madagascariensis Grandidier, 1928 (Chiroptera: Pteropodidae) in Eastern Madagascar. Mammalia. 2011, 75, 69–78. https://doi.org/10.1515/mamm.2010.071
162. A Chiropteran Survey of the Lac Kinkony-Mahavavy Area in Western Madagascar. Available online: https://protectedareas.mg/document/show/196260 (accessed on 5 March 2025).
163. Vincenot C.E., Koyama L., Russo D. Near Threatened? First Report of Unsuspected Human-Driven Decline Factors in the Ryukyu Flying Fox (Pteropus Dasymallus) in Japan. Mammalian Biology. 2015, 80, 273–277. https://doi.org/10.1016/j.mambio.2015.03.003
164. Randrianandrianina F.H., Racey P.A., Jenkins R.K.B. Hunting and Consumption of Mammals and Birds by People in Urban Areas of Western Madagascar. Oryx. 2010, 44, 411–415. https://doi.org/10.1017/S003060531000044X
165. Local Demand Drives a Bushmeat Industry in a Philippine Forest Preserve. Available online: https://journals.sagepub.com/doi/10.1177/194008291200500203?icid=int.sj-full-text.similar-articles.6 (accessed on 5 March 2025).
166. Campbell C.A.R. Bats, Mosquitoes and Dollars. The Minerva Group, Inc.: Lakewood, CO, USA, 2002.
167. Bailey V. The Mammals and Life Zones of Oregon. North American Fauna. 1936, 1–348. https://doi.org/10.3996/nafa.55.0001
168. Rysgaard G.N. A Study of the Cave Bats of Minnesota with Especial Reference to the Large Brown Bat, Eptesicus Fuscus Fuscus (Beauvois). The American Midland Naturalist. 1942, 28, 245–267. https://doi.org/10.2307/2420702
169. Hitchcock H.B. Twenty-Three Years of Bat Banding in Ontario and Quebec. The Canadian field-naturalist. 1965, 79, 4–14. https://doi.org/10.5962/p.342362
170. Brown D.E. Vampiro: Vampire Bat in Fact & Fantasy, Second edition. University of Utah Press: Salt Lake City, UT, USA, 1999.

171. Tuttle M.D. Status, Causes of Decline, and Management of Endangered Gray Bats. The Journal of Wildlife Management. 1979, 43, 1–17. https://doi.org/10.2307/3800631
172. Humphrey S.R. Population Ecology of the Little Brown Bat, Myotis Lucifugus, in Indiana and North-Central Kentucky. Oklahoma State University: Stillwater, OK, USA, 1971.
173. Humphrey S.R. Status, Winter Habitat, and Management of the Endangered Indiana Bat, Myotis Sodalis. Florida Scientist. 1978, 41, 65–76.
174. Phillips G.L. Ecology of the Big Brown Bat (Chiroptera: Vespertilionidae) in Northeastern Kansas. The American Midland Naturalist. 1966, 75, 168–198. https://doi.org/10.2307/2423489
175. Miscellaneous Publication - University of Kansas, Museum of Natural History. Available online: https://www.biodiversitylibrary.org/bibliography/4050 (accessed on 5 March 2025).
176. Barbour R.W., Davis W.H., Hassell M.D. The Need of Vision in Homing by Myotis Sodalis. Journal of Mammalogy. 1966, 47, 355–357. https://doi.org/10.2307/1378156
177. Mohr C. Delaware Issues a Bat Alert. Delaware Conservationist. 1972, 16, 22–23.
178. Barclay R.M.R., Thomas D.W., Fenton M.B. Comparison of Methods Used for Controlling Bats in Buildings. The Journal of Wildlife Management. 1980, 44, 502–506. https://doi.org/10.2307/3807989
179. Arellano-Sota C. Biology, Ecology, and Control of the Vampire Bat. Reviews of Infectious Diseases. 1988, 10, S615-619. https://doi.org/10.1093/clinids/10.supplement_4.s615
180. Murphy M. Vandals Destroy Hibernating Indiana Bats. Bats. 1987, 5, 5–8.
181. Sidner R.M. Studies of Bats in Southeastern Arizona with Emphasis on Aspects of Life History of Antrozous Pallidus and Eptesicus Fuscus. The University of Arizona: Tucson, AZ, USA, 1997.
182. Bionomics and Chemical Control of Free-Tailed House Bats (Molossus) in Trinidad. - Fish and Wildlife Service Special Scientific Reports - Wildlife - WS Digital Collections. Available online: https://nwrc.contentdm.oclc.org/digital/collection/p16473coll30/id/8830/ (accessed on 5 March 2025).
183. Greenhall A.M. Vampire Bat Control: A Review and Proposed Research Programme for Latin America. In: Proceedings of the Vertebrate Pest Conference; 3–5, March, 1970; West Sacramento, CA, USA.
184. Kasso M., Balakrishnan M. Ecological and Economic Importance of Bats (Order Chiroptera). International Scholarly Research Notices. 2013, 2013, 187415. https://doi.org/10.1155/2013/187415
185. Blehert D., Lankau E. Pseudogymnoascus Destructans (White-Nose Syndrome Fungus). CABI Compendium. 2017, 119002. https://doi.org/10.1079/cabicompendium.119002
186. Carlsbad Caverns' 500K Bats Face Threat of Deadly Syndrome. Available online: https://apnews.com/general-news-travel-ee9f47f5b8c04dbda424cae1fcce6440 (accessed on 6 March 2025).
187. Tuttle, M.D. Joint Effort Saves Vital Bat Cave. Bats. 1985, 2, 34.
188. Richter A.R., Humphrey S.R., Cope J.B., Brack Jr V. Modified Cave Entrances: Thermal Effect on Body Mass and Resulting Decline of Endangered Indiana Bats (Myotis Sodalis). Conservation Biology. 1993, 7, 407–415. https://doi.org/10.1046/j.1523-1739.1993.07020407.x
189. Gore J.A., Hovis J.A. Status and Conservation of Southeastern Myotis Maternity Colonies in Florida Caves. Florida Scientist. 1998, 61, 160–170.
190. Whitaker J.O., Hamilton W.J. Mammals of the Eastern United States, Third edition. Comstock Publishing Associates: Ithaca, NY, USA, 1998.
191. Boyles J.G., Brack Jr V., McGuire L.P. Balancing Costs and Benefits of Managing Hibernacula of Cavernicolous Bats. Mammal Review. 2023, 53, 133–142. https://doi.org/10.1111/mam.12316
192. Van tassel T. To Save the Spectacled Flying Fox. Bats. 1995, 13, 13–15.
193. Woods M., Mcdonald R.A., Harris S. Predation of Wildlife by Domestic Cats Felis Catus in Great Britain. Mammal Review. 2003, 33, 174–188. https://doi.org/10.1046/j.1365-2907.2003.00017.x
194. Rodríguez-Durán A., Pérez J., Montalbán M.A., Sandoval J.M. Predation by Free-Roaming Cats on an Insular Population of Bats. Acta Chiropterologica. 2010, 12, 359–362. https://doi.org/10.3161/150811010X537945
195. Lyon Jr M.W. Bats Caught by Burdocks. Journal of Mammalogy. 1925, 6, 280. https://doi.org/10.1093/jmammal/6.4.280-a
196. Barbour R.W., Davis W.H. Bats of America. University Press of Kentucky: Lexington, KY, USA, 1969.
197. Sotillo A., Viol I., Barré K., Bas Y., Kerbiriou C. Context-dependent effects of wind turbines on bats in rural landscapes. Biological Conservation. 2024, 295, 110647. https://doi.org/10.1016/j.biocon.2024.110647

198. Amorim, F., Rodrigues, L. Bats and Wind Farms in Portugal: Factors Influencing Bat Activity and Mortality, and Evaluation of Methods. Barbastella 2012, 4, 61.
199. Smith G. Bats and Windfarms: (CA223). Caves Australia. 2023
200. Ceron K., Bôlla D.A.S., Mattia D.L.D., Carvalho F., Zocche J.J. Roadkilled Bats (Mammalia: Chiroptera) in Two Highways of Santa Catarina State, Southern Brazil. Oecologia Australis. 2017, 21, 207–212. https://doi.org/10.4257/oeco.2017.2102.12
201. Červený J., Bufka L. Extremely High Mortality of Newborn Juveniles in the Nursery Colony of Myotis Myotis at Žihobce, SW Bohemia, Czech Republic (Chiroptera: Vespertilionidae). Lynx. 2021, 51, 31–40. https://doi.org/10.37520/lynx.2020.003
202. Choi J.Y., Habte G., Khan N., Nho E.Y., Hong J.H., Choi H., Park K.S., Kim K.S. Determination of Toxic Heavy Metals in Echinodermata and Chordata Species from South Korea. Food Additives & Contaminants: Part B. 2014, 7, 295–301. https://doi.org/10.1080/19393210.2014.932311
203. de Figueiredo Ramalho D., Resende D., de Oliveira T.F., Santos R.A.L., de Souza Aguiar L.M. Factors Influencing Bat Road Casualties in a Neotropical Savanna. Perspectives in Ecology and Conservation. 2021, 19, 189–194. https://doi.org/10.1016/j.pecon.2021.03.004
204. Drake D., Jennelle C., Liu J.-N., Grodsky S., Schumacher S., Sponsler M. Regional Analysis of Wind Turbine-Caused Bat Mortality. Acta Chiropterologica. 2015, 17, 179–188. https://doi.org/10.3161/15081109ACC2015.17.1.015
205. Foster G.W., Humphrey S.R., Humphrey P.P. Survival Rate of Young Southeastern Brown Bats, Myotis Austroriparius, in Florida. Journal of Mammalogy. 1978, 59, 299–304. https://doi.org/10.2307/1379913
206. Gaisler J., Řehák Z., Bartonička T. Bat Casualties by Road Traffic (Brno-Vienna). Acta Theriologica. 2009, 54, 147–155. https://doi.org/10.1007/BF03193170
207. Grodsky S.M., Behr M.J., Gendler A., Drake D., Dieterle B.D., Rudd R.J., Walrath N.L. Investigating the Causes of Death for Wind Turbine-Associated Bat Fatalities. Journal of Mammalogy. 2011, 92, 917–925. https://doi.org/10.1644/10-MAMM-A-404.1
208. Johnson G.D., Perlik M.K., Erickson W.P., Strickland M.D. Bat Activity, Composition, and Collision Mortality at a Large Wind Plant in Minnesota. Wildlife Society Bulletin. 2004, 32, 1278–1288. https://doi.org/10.2193/0091-7648(2004)032[1278:BACACM]2.0.CO;2
209. Kunz T.H. Reproduction, Growth, and Mortality of the Vespertilionid Bat, Eptesicus Fuscus, in Kansas. Journal of Mammalogy. 1974, 55, 1–13. https://doi.org/10.2307/1379252
210. Lesiński G. Bat Road Casualties and Factors Determining Their Number. Mammalia. 2007, 71, 138–142. https://doi.org/10.1515/MAMM.2007.020
211. McKechnie A.E., Rushworth I.A., Myburgh F., Cunningham S.J. Mortality among Birds and Bats during an Extreme Heat Event in Eastern South Africa. Austral Ecology. 2021, 46, 687–691. https://doi.org/10.1111/aec.13025
212. Picard B., Garcia J.S., Gouriou S., Duriez P., Brahimi N., Bingen E., Elion J., Denamur E. The Link between Phylogeny and Virulence in Escherichia Coli Extraintestinal Infection. Infection and Immunity. 1999, 67, 546–553. https://doi.org/10.1128/IAI.67.2.546-553.1999
213. Piorkowski M.D., O'Connell T.J. Spatial Pattern of Summer Bat Mortality from Collisions with Wind Turbines in Mixed-Grass Prairie. The American Midland Naturalist. 2010, 164, 260–269. https://doi.org/10.1674/0003-0031-164.2.260
214. Pruvot M., Cappelle J., Furey N., Hul V., Heng H.S., Duong V., Dussart P., Horwood P. Extreme Temperature Event and Mass Mortality of Insectivorous Bats. European Journal of Wildlife Research. 2019, 65, 41. https://doi.org/10.1007/s10344-019-1280-8
215. Ruczyński I., Ruczyńska I., Kasprzyk K. Winter Mortality Rates of Bats Inhabiting Man-Made Shelters (Northern Poland). Acta Theriologica. 2005, 50, 161–166. https://doi.org/10.1007/BF03194479
216. Vargas-Jiménez I., Rico. Y. Impact of wind farms on flying vertebrates: a systematic review for tropical and subtropical zones. Biodiversity. 2025, 26, 251–262. https://doi.org/10.1080/14888386.2025.2504970
217. Thompson R.C.A. Parasite Zoonoses and Wildlife: One Health, Spillover and Human Activity. International Journal for Parasitology. 2013, 43, 1079–1088. https://doi.org/10.1016/j.ijpara.2013.06.007
218. Schulz M., Lumsden L. National Recovery Plan for the Christmas Island Pipistrelle Pipistrellus Murrayi. Department of the Environment and Heritage: Canberra, Australia, 2004.

219. Oliveira L.C., Brilhante R.S.N., Cunha A.M.S., Carvalho C.B.M. Perfil de isolamento microbiano em cães com otite média e externa associadas. Arquivo Brasileiro de Medicina Veterinária e Zootecnia. 2006, 58, 1009–1017. https://doi.org/10.1590/S0102-09352006000600006
220. Gilad D., Borgelt J., May R., Dorber M., Verones F. Biodiversity impacts of Norway's renewable electricity grid. Journal of Cleaner Production. 2024, 469, 143096. https://doi.org/10.1016/j.jclepro.2024.143096
221. Allen J.A., Lang H., Chapin J.P. The American Museum Congo Expedition Collection of Bats. Bulletin of the AMNH. 1917, 37, 18.
222. McMahon T.A., Halstead N.T., Johnson S., Raffel T.R., Romansic J.M., Crumrine P.W., Rohr J.R. Fungicide-Induced Declines of Freshwater Biodiversity Modify Ecosystem Functions and Services. Ecology Letters. 2012, 15, 714–722. https://doi.org/10.1111/j.1461-0248.2012.01790.x
223. Leroy E.M., Epelboin A., Mondonge V., Pourrut X., Gonzalez J.-P., Muyembe-Tamfum J.-J., Formenty P. Human Ebola Outbreak Resulting from Direct Exposure to Fruit Bats in Luebo, Democratic Republic of Congo, 2007. Vector Borne Zoonotic Diseases. 2009, 9, 723–728. https://doi.org/10.1089/vbz.2008.0167
224. Amman B.R., Nyakarahuka L., McElroy A.K., Dodd K.A., Sealy T.K., Schuh A.J., Shoemaker T.R., Balinandi S., Atimnedi P., Kaboyo W., et al. Marburgvirus Resurgence in Kitaka Mine Bat Population after Extermination Attempts, Uganda. Emerging Infectious Diseases. 2014, 20, 1761–1764. https://doi.org/10.3201/eid2010.140696
225. Makin D., Mendelssohn H. The Fruit Bat Issue in Israel. Bat News. 1987, 11, 4–5.
226. Medway L. 300,000 Bats. Sarawak Museum Journal. 1958, 8, 667–679.
227. Wildlife in Lao PDR: 1999 Status Report. Available online: https://www.nhbs.com/wildlife-in-lao-pdr-1999-status-report-book (accessed on 8 March 2025).
228. Anonymous Saving Dawn Bats from Nets. Bats. 30.
229. Tella J.L., Hernández-Brito D., Blanco G., Hiraldo F. Urban Sprawl, Food Subsidies and Power Lines: An Ecological Trap for Large Frugivorous Bats in Sri Lanka? Diversity. 2020, 12, 94. https://doi.org/10.3390/d12030094
230. Rajeshkumar S., Raghunathan C., Venkataraman K. Observation on Electrocution of Flying Fox (Pteropus Giganteus) In Andaman Islands and Their Conservation Strategies. Journal of the Andaman Science Association. 2013, 18, 213–215.
231. Chouhan R., Shrivastava S. Observation on Electrocution of Indian Flying Fox (Pteropus Giganteus) in Ramganjmandi, Kota, (Rajasthan) and Their Conservation Strategies. International Journal of Research in Engineering, Science and Management. 2019, 2, 648–649. https://doi.org/10.5281/zenodo.13438515
232. Khayat R.O.S., Grant R.A., Ryan H., Melling L.M., Dougill G., Killick D.R., Shaw K.J. Investigating Cat Predation as the Cause of Bat Wing Tears Using Forensic DNA Analysis. Ecology and Evolution. 2020, 10, 8368–8378. https://doi.org/10.1002/ece3.6544
233. Vlaschenko A., Kovalov V., Hukov V., Kravchenko K., Rodenko O. An Example of Ecological Traps for Bats in the Urban Environment. European Journal of Wildlife Research. 2019, 65, 20. https://doi.org/10.1007/s10344-019-1252-z
234. Delpietro H., Konolsaisen F., Marchevsky N., Russo G. Domestic Cat Predation on Vampire Bats (Desmodus Rotundus) While Foraging on Goats, Pigs, Cows and Human Beings. Applied Animal Behaviour Science. 1994, 39, 141–150. https://doi.org/10.1016/0168-1591(94)90134-1
235. Mori E., Menchetti M., Camporesi A., Cavigioli L., Tabarelli de Fatis K., Girardello M. License to Kill? Domestic Cats Affect a Wide Range of Native Fauna in a Highly Biodiverse Mediterranean Country. Frontiers in Ecology and Evolution. 2019, 7, 477. https://doi.org/10.3389/fevo.2019.00477
236. Woinarski J.C.Z., South S.L., Drummond P., Johnston G.R., Nankivell A. The Diet of the Feral Cat (Felis Catus), Red Fox (Vulpes Vulpes) and Dog (Canis Familiaris) over a Three-Year Period at Witchelina Reserve, in Arid South Australia. Australian Mammalogy. 2017, 40, 204–213. https://doi.org/10.1071/AM17033
237. Romano M.C., Maidagan J.I., Pire E.F. Behavior and Demography in an Urban Colony of Tadarida Brasiliensis (Chiroptera: Molossidae) in Rosario, Argentina. Revista de Biología Tropical. 1999, 47, 1121–1127.
238. Daniel M.J., Williams G.R. A Survey of the Distribution, Seasonal Activity and Roost Sites of New Zealand Bats. New Zealand Journal of Ecology. 1984, 7, 9–25.
239. Borroto-Páez R., Mancina C.A. Biodiversity and Conservation of Cuban Mammals: Past, Present, and Invasive Species. Journal of Mammalogy. 2017, 98, 964–985. https://doi.org/10.1093/jmammal/gyx017
240. Bigai L.R., Faria M.B. Eventos predatórios em morcegos no Brasil. Revista de Biologia Neotropical/ Journal of Neotropical Biology. 2018, 15, 96–108. https://doi.org/10.5216/rbn.v15i2.53478

241. Ávila-Vargas L., Soler-Tovar D., Dong Q., Escobar L.E. Anticoagulants for the Control of the Common Vampire Bat (Desmodus Rotundus). Zoonoses and Public Health. 2025, 72, 101–116. https://doi.org/10.1111/zph.13196
242. Jung T.S., Lausen C.L., Talerico J.M., Slough B.G. Opportunistic Predation of a Little Brown Bat (Myotis Lucifugus) by a Great Horned Owl (Bubo Virginianus) in Southern Yukon. Northwestern Naturalist. 2011, 92, 69–72.
243. Mancina C.A. Phyllonycteris Poeyi (Chiroptera: Phyllostomidae). Mammalian Species. 2010, 42, 41–48. https://doi.org/10.1644/852.1
244. Brickner-Braun I., Geffen E. and Yom-Tov Y. The Domestic Cat as a Predator of Israeli Wildlife. Israel Journal of Ecology & Evolution. 2007, 53, 129–142. https://doi.org/10.1560/IJEE.53.2.129
245. Vázquez-Domínguez E., Ceballos G., Cruzado J. Extirpation of an Insular Subspecies by a Single Introduced Cat: The Case of the Endemic Deer Mouse Peromyscus Guardia on Estanque Island, Mexico. Oryx. 2004, 38, 347–350. https://doi.org/10.1017/S0030605304000602
246. Calver M., Thomas S., Bradley S., McCutcheon H. Reducing the Rate of Predation on Wildlife by Pet Cats: The Efficacy and Practicability of Collar-Mounted Pounce Protectors. Biological Conservation. 2007, 137, 341–348. https://doi.org/10.1016/j.biocon.2007.02.015
247. Triggs B., Brunner H., Cullen J.M. The Food of Fox, Dog and Cat in Croajingalong National Park, South-Eastern Victoria. Wildlife Ressearch. 1984, 11, 491–499. https://doi.org/10.1071/wr9840491
248. Kutt A.S. The Diet of the Feral Cat (Felis Catus) in North-Eastern Australia. Acta Theriologica. 2011, 56, 157–169. https://doi.org/10.1007/s13364-010-0016-7
249. Dey P., Ahuja A., Panwar J., Choudhary P., Rani S., Kaur M., Sharma A., Kaur J., Yadav A.K., Sood V., et al. Immune Control of Avian Influenza Virus Infection and Its Vaccine Development. Vaccines. 2023, 11, 593.https://doi.org/10.3390/vaccines11030593