Chiropterologie

Kurz IV

Tomáš Bartonička

Ústav botaniky a zoologie

PřF MU

Letouni a ochrana přírody

Role netopýrů v ekosystémech a přínos pro člověka

- důležité složky ekologických sítí (zejm. v tropech)
- kontrola početnosti hmyzu
- polinátoři ekonomicky důležitých zemědělských plodin
- x zdroj infekčních chorob (vzteklina, EBOLA, West-Nile, Marburg virus...)

letouni - netopýři - dlouhověkost, 1-2 mláďata, vysoká socialita, specifické adaptace

monitoring a bioindikace - vysoká specializovanost

právní ochrana –
vyhláška č. 395/1992 Sb., zákon č. 114/1992 Sb., o ochraně přírody a krajiny.
Dohoda o ochraně netopýrů v Evropě (EUROBATS), dodatkem
Úmluvy o ochraně stěhovavých druhů volně žijících živočichů (Bonská úmluva).

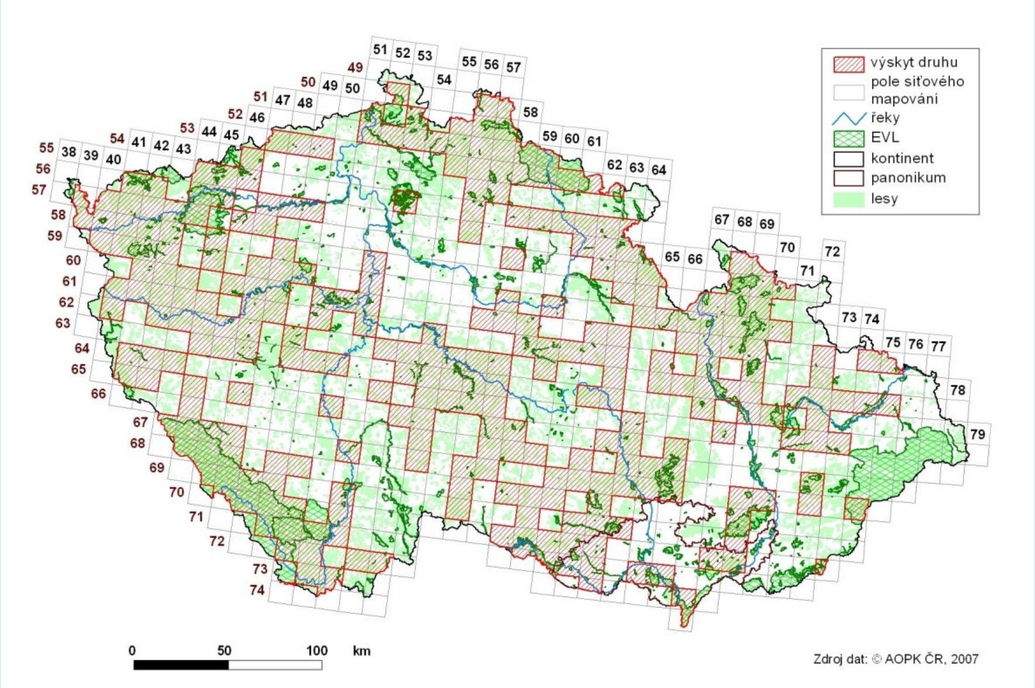
kadavery po kolizi s automobilovou dopravou

Leptonycteris obalená pylem Agave

Natura 2000

- **Směrnice o stanovištích** (č. 93/43/EEC)
- předmětné druhy
- *Barbastella barbastellus, Myotis bechsteinii, M. blythii, M. dasycneme, M. emarginatus, M. myotis, R. hipposideros*

- biomonitoring.cz
- *B. barbastellus*



vyhláška č. 395/1992 Sb., zákon č. 114/1992 Sb.,

- Všechny druhy netopýrů vyskytující se v České republice jsou zákonem chráněné
- **zákonná ochrana se týká nejen samotných jedinců netopýrů, ale i jejich přirozených i umělých sídel a jejich biotopu. Znamená to, že ochrany dle ZOPK požívají jak jeskyně či štoly, tak i úkryty v budovách, které netopýři využívají k vytváření letních kolonií nebo k zimování.**

- **27 druhů,** šest z nich je v kategorii kriticky ohrožený (Bbar, Mdas, Mmyo, Mema, Rhip, Rfer), ostatní v kategorii silně ohrožený druh.

- Zákon o ochraně přírody a krajiny doplňuje **Zákon na ochranu zvířat proti týrání** (č. 246/1992 Sb.), který se zabývá zejména ochranou jedinců a který zakazuje týrání a bezdůvodné usmrcování všech obratlovců včetně netopýrů.

Dohoda o ochraně populací evropských netopýrů (zkratka EUROBATS)

EUROBATS

UNEP/EUROBATS

Agreement on the Conservation of Populations of European Bats

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Introduction to the Agreement

The Bat Agreement

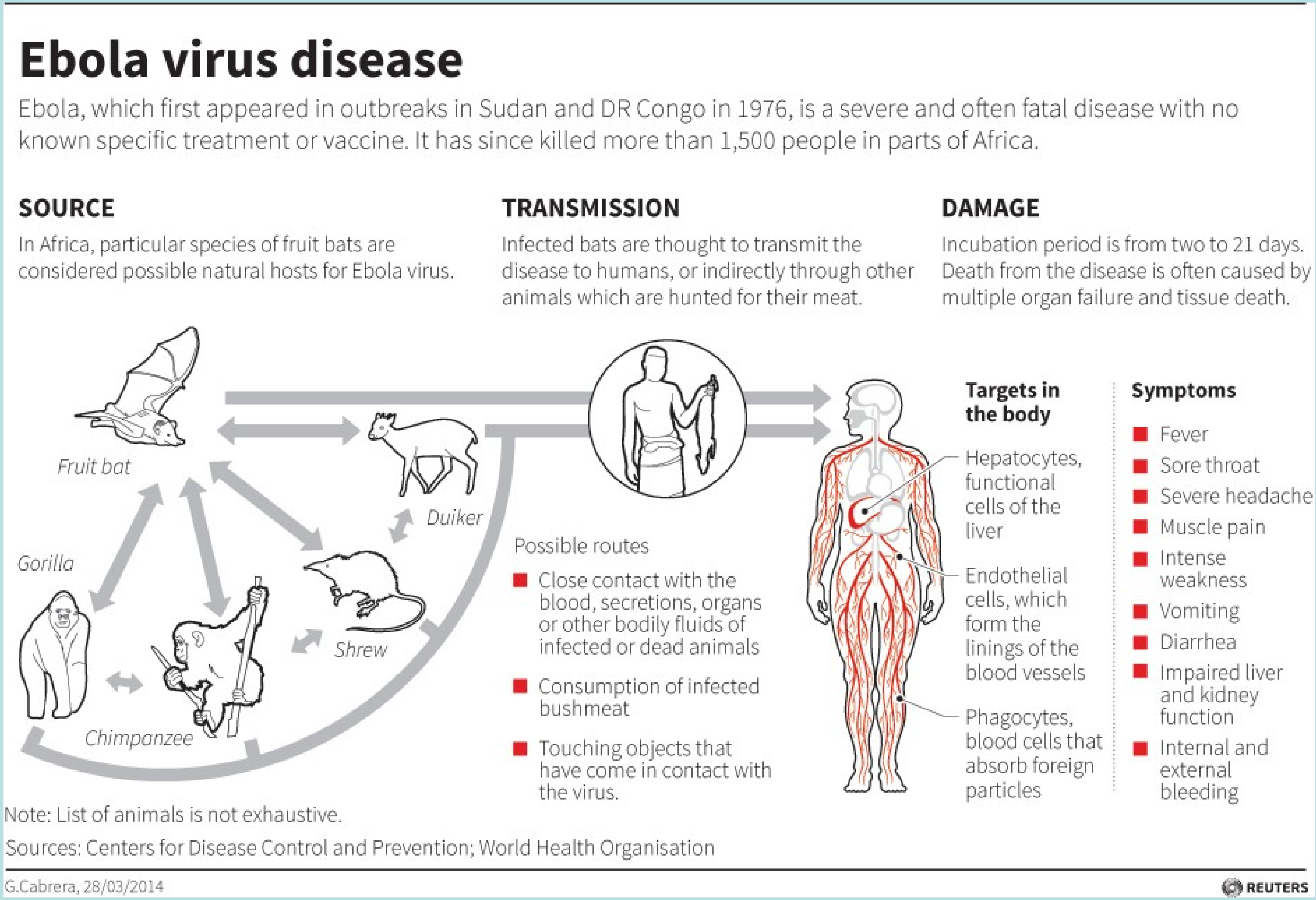
The Agreement on the Conservation of Populations of European Bats came into force in 1994 and until now a total of 36 out of 63 range states have acceded to the Agreement.

The Agreement was set up under the **Convention on the Conservation of Migratory Species of Wild Animals**, which recognises that endangered migratory species can be properly protected only if activities are carried out over the entire migratory range of the species.

The Bat Agreement aims to protect all **53 European bat species** through legislation, education, conservation measures and international co-operation with Agreement members and with those who have not yet joined. The Agreement provides a framework of co-operation for the conservation of bats throughout Europe, Northern Africa and the Middle East.

In 1995, the First Session of the Meeting of Parties to the Agreement formed an Action Plan, which was

- letouni jako přenašeči chorob
- tolerance vůči intracelulárním patogenům (Brook & Dobson 2014)
- opatrnost při komunikaci s veřejností



RESEARCH ARTICLE

Are disease reservoirs special? Taxonomic and life history characteristics

Benjamin T. Plourde[1]*, Tristan L. Burgess[2], Evan A. Eskew[3,4], Tara M. Roth[1], Nicole Stephenson[1], Janet E. Foley[1]

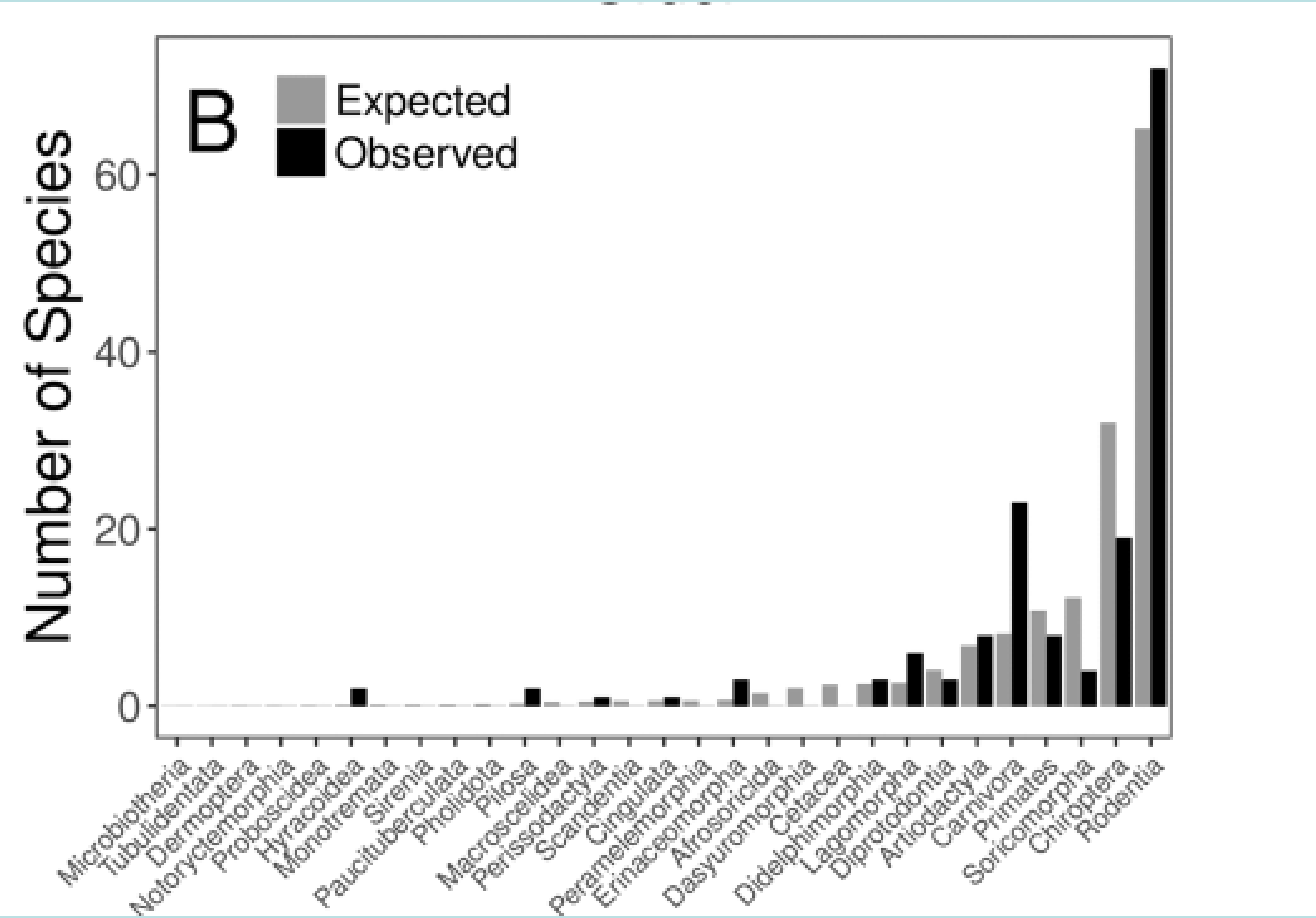
Table 4. Summary of disease system reservoirs by major animal taxa.

		Epidemic Potential Zone*				High Priority Zoonotic Pathogens†	
Reservoir Taxon	All Systems (n = 330)	Dead-End (220)	Stuttering Chains (44)	Epidemic Potential (66)	Human Target (261)	Top 25% (109)	Top 10% (45)
Amphibian	3.03% (10)	3.18% (7)	0.00% (0)	4.55% (3)	2.68% (7)	0.00% (0)	0.00% (0)
Annelid	0.30% (1)	0.45% (1)	0.00% (0)	0.00% (0)	0.38% (1)	0.00% (0)	0.00% (0)
Arthropod‡	42.42% (140)	43.64% (96)	40.91% (18)	39.39% (26)	45.21% (118)	44.04% (48)	44.44% (20)
Bird	8.79% (29)	9.09% (20)	6.82% (3)	9.09% (6)	9.96% (26)	12.84% (14)	17.78% (8)
Fish	5.15% (17)	7.27% (16)	0.00% (0)	1.52% (1)	6.13% (16)	0.92% (1)	0.00% (0)
Helminth	0.91% (3)	1.36% (3)	0.00% (0)	0.00% (0)	0.00% (0)	0.00% (0)	0.00% (0)
Mammal	84.24% (278)	84.09% (185)	93.18% (41)	78.79% (52)	86.59% (226)	86.24% (94)	88.89% (40)
Mollusk	7.27% (24)	7.73% (17)	4.55% (2)	7.58% (5)	7.28% (19)	2.75% (3)	0.00% (0)
Reptile	2.42% (8)	3.18% (7)	2.27% (1)	0.00% (0)	3.07% (8)	0.00% (0)	0.00% (0)

Table 5. Summary of mammalian reservoirs by orders represented.

		Epidemic Potential Zone*				High Priority Zoonotic Pathogens†	
Order	All Systems (n = 330)	Dead-End (220)	Stuttering Chains (44)	Epidemic Potential (66)	Human Target (261)	Top 25% (109)	Top 10% (45)
Artiodactyla	25.45% (84)	20.45% (45)	47.73% (21)	27.27% (18)	21.07% (55)	23.85% (26)	26.67% (12)
Carnivora	25.15% (83)	28.64% (63)	20.45% (9)	16.67% (11)	25.29% (66)	22.94% (25)	15.56% (7)
Cetacea	0.30% (1)	0.45% (1)	0.00% (0)	0.00% (0)	0.38% (1)	0.00% (0)	0.00% (0)
Chiroptera	2.42% (8)	1.36% (3)	2.27% (1)	6.06% (4)	3.07% (8)	4.59% (5)	4.44% (2)
Cingulata	0.91% (3)	0.45% (1)	4.55% (2)	0.00% (0)	1.15% (3)	1.83% (2)	4.44% (2)
Didelphimorphia	0.61% (2)	0.00% (0)	4.55% (2)	0.00% (0)	0.77% (2)	1.83% (2)	2.22% (1)
Diprotodontia	0.61% (2)	0.45% (1)	0.00% (0)	1.52% (1)	0.38% (1)	0.92% (1)	0.00% (0)
Erinaceomorpha	0.30% (1)	0.45% (1)	0.00% (0)	0.00% (0)	0.38% (1)	0.00% (0)	0.00% (0)
Hyracoidea	0.30% (1)	0.45% (1)	0.00% (0)	0.00% (0)	0.38% (1)	0.00% (0)	0.00% (0)
Lagomorpha	3.03% (10)	2.73% (6)	0.00% (0)	6.06% (4)	2.30% (6)	0.00% (0)	0.00% (0)
Perissodactyla	2.73% (9)	3.18% (7)	0.00% (0)	3.03% (2)	3.07% (8)	0.92% (1)	0.00% (0)
Pilosa	0.61% (2)	0.45% (1)	2.27% (1)	0.00% (0)	0.77% (2)	0.00% (0)	0.00% (0)
Primates	3.03% (10)	1.36% (3)	4.55% (2)	7.58% (5)	3.83% (10)	6.42% (7)	8.89% (4)
Rodentia	29.09% (96)	33.64% (74)	25.00% (11)	16.67% (11)	36.02% (94)	35.78% (39)	35.56% (16)
Soricomorpha	1.21% (4)	1.36% (3)	2.27% (1)	0.00% (0)	1.53% (4)	1.83% (2)	0.00% (0)

Ve vztahu k člověku



CONSERVATION

Economic Importance of Bats in Agriculture

Insectivorous bat populations, adversely impacted by white-nose syndrome and wind turbines, may be worth billions of dollars to North American agriculture.

Justin G. Boyles,[1]* Paul M. Cryan,[2] Gary F. McCracken,[3] Thomas H. Kunz[4]

White-nose syndrome (WNS) and the increased development of wind-power facilities are threatening populations of insectivorous bats in North America. Bats are voracious predators of nocturnal insects, including many crop and forest pests. We present here analyses suggesting that loss of bats in North America could lead to agricultural losses estimated at more than $3.7 billion/year. Urgent efforts are needed to educate the public and policy-makers about the ecological and economic importance of insectivorous bats and to provide practical conservation solutions.

Infectious Disease and Wind Turbines

Insectivorous bats suppress populations of nocturnal insects (*1*, *2*), but bats in North America are under severe pressure from two major new threats. WNS is an emerging infectious disease affecting populations of hibernating cave-dwelling bats throughout eastern North America (*3*). WNS is likely caused by a newly discovered fungus (*Geomyces destructans*). This fungus infects

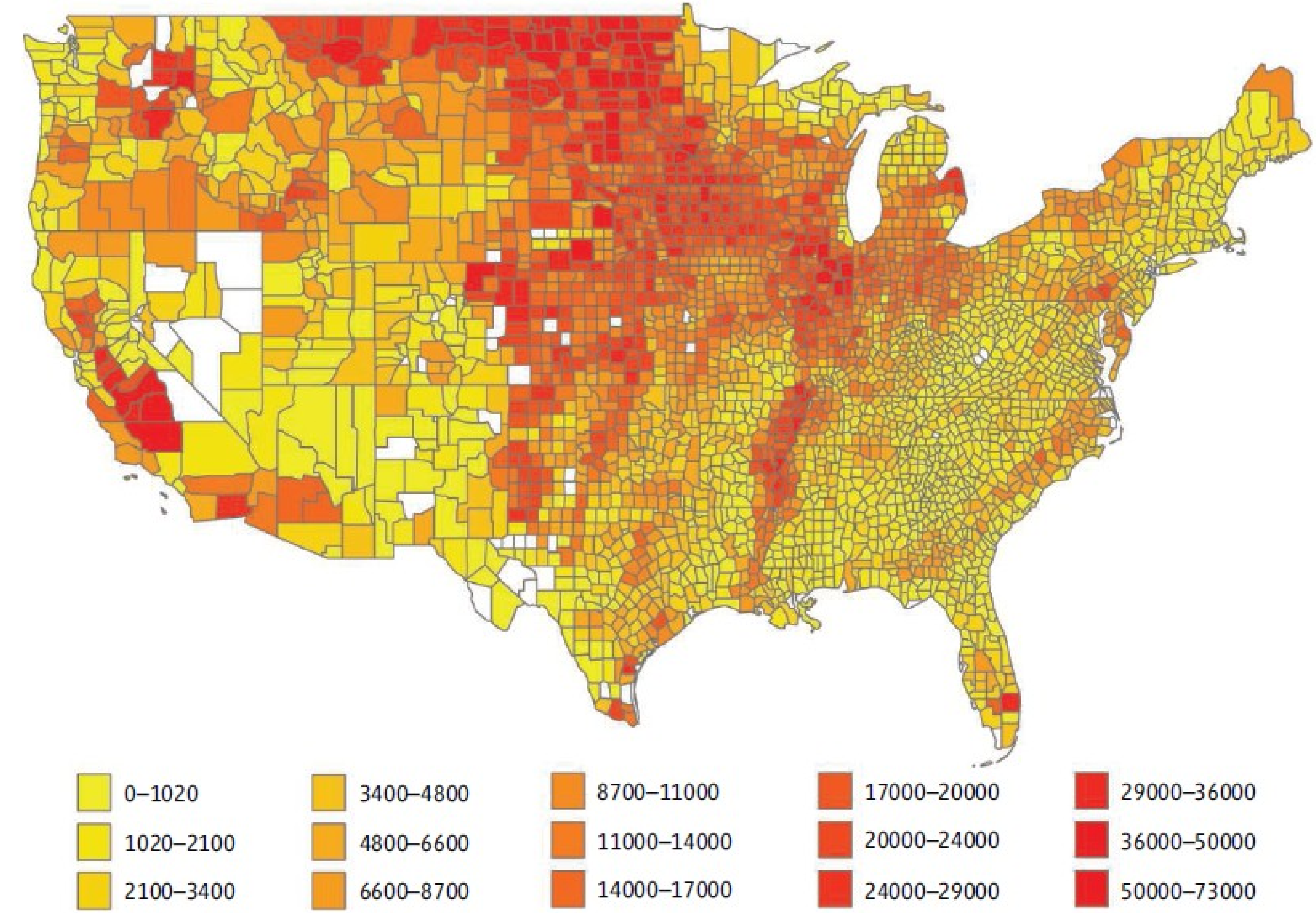
At the same time, bats of several migratory tree-dwelling species are being killed in unprecedented numbers at wind turbines across the continent (*6*, *7*). Why these species are particularly susceptible to wind turbines remains a mystery, and several types of attraction have been hypothesized (*6*). There are no continental-scale monitoring programs for assessing wildlife fatalities at wind turbines, so the number of bats killed across the entire United States is difficult to assess. However, by 2020 an estimated 33,000 to 111,000 bats will be killed annually by wind turbines in the Mid-Atlantic Highlands alone (*7*). Obviously, mortality from these two factors is substantial and will likely have long-term cumulative impacts on both aquatic and terrestrial ecosystems (*5*, *7*). Because of these combined threats, sudden and simultaneous population declines are being witnessed in assemblages of temperate-zone insectivorous bats on a scale rivaled by few recorded events affecting mammals.

Economic Impact

Although much of the public and some policy-makers may view the precipitous decline of bats in North America as only of academic interest, the economic consequences of losing so many bats could be substantial. For example, a single colony of 150 big brown bats (*Eptesicus fuscus*) in Indiana has been estimated to eat nearly 1.3 million pest insects each year, possibly contributing to the disruption of population cycles of agricultural pests (*8*). Other estimates suggest that a single little brown bat can consume 4 to 8 g of insects each night during the active season (*9*, *10*), and when extrapolated to the one million bats estimated to have died from WNS, between 660 and 1320 metric tons of insects are no longer being consumed each year in WNS-affected areas (*11*).

Estimating the economic importance of bats in agricultural systems is challenging, but published estimates of the value of pest suppression services provided by bats ranges

m www.sciencemag.org on March 31, 2011



The worth of insectivorous bats. Estimated annual value of insectivorous bats in the agricultural industry at the county level. Values (×$1000 per county) assume bats have an avoided-cost value of ~$74/acre of cropland (*12*). (See SOM for details.)

Netopýři ročně ušetří v USA cca 23 miliard $ (Boyles et al. 2011, Science)

PLOS ONE TENTH ANNIVERSARY

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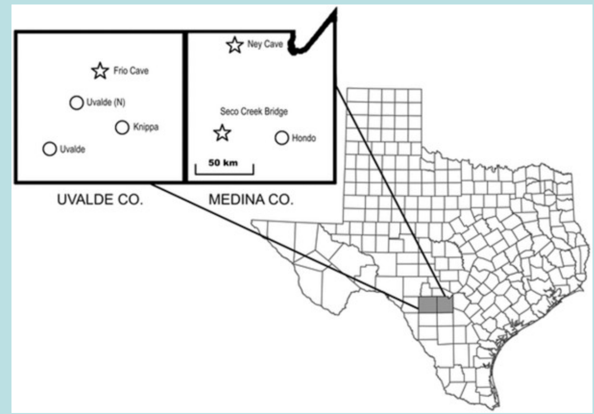
RESEARCH ARTICLE

Bats Track and Exploit Changes in Insect Pest Populations

Gary F. McCracken, John K. Westbrook, Veronica A. Brown, Melanie Eldridge, Paula Federico, Thomas H. Kunz

Published: August 31, 2012 • https://doi.org/10.1371/journal.pone.0043839

Helicoverpa zea



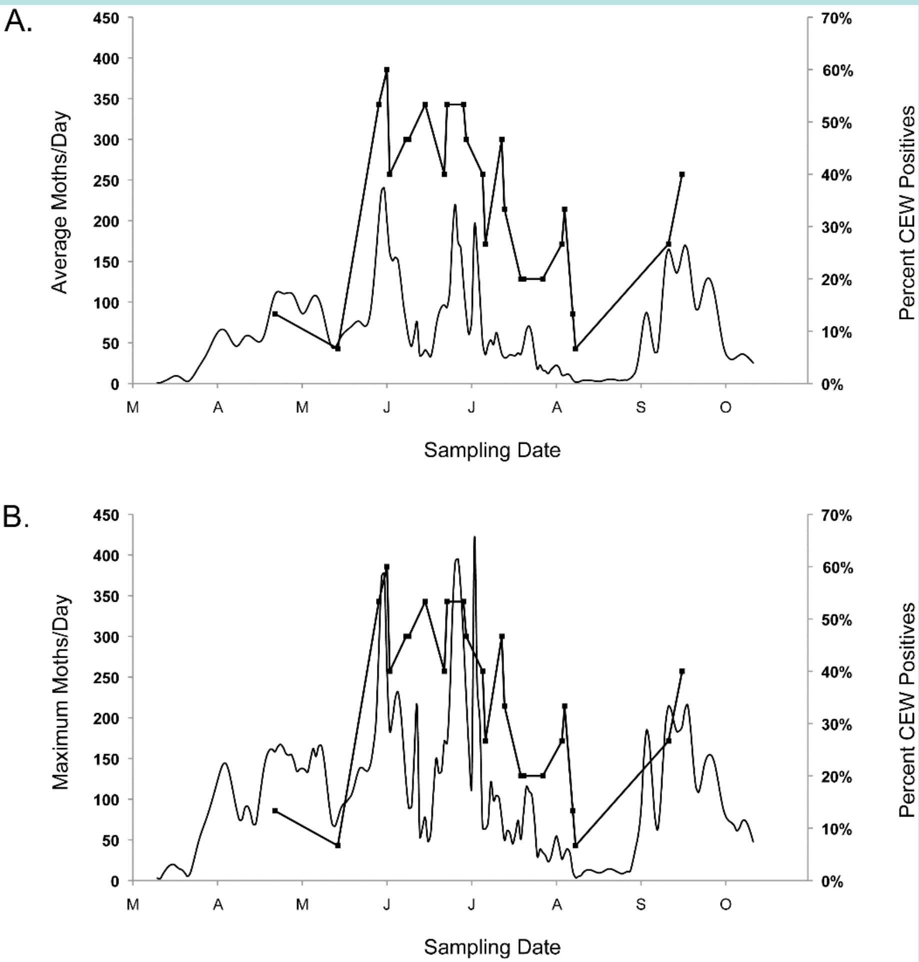


Figure 3. CEW moth abundance and bats positive for the CEW gene marker in their feces.

Moth abundances (solid lines, left scales) are the average (A) and the maximum (B) of the estimated numbers of moths captured at any of the four pheromone trap sites. Positives (lines with squares, right scales) are the percentage of fecal samples that yielded the CEW gene marker in at least one qPCR reaction.

alternativně se používá *Bacillus thuringiensis*

nutnost aplikovat až na ~95% polích the Winter Garden region.

netopýři uspoří v oblasti $688,000

Hlavní faktory ohrožující netopýry

- **<u>změny a fragmentace biotopů</u>**
- **<u>ztráta úkrytových možností</u>**
- změna klimatu?
- nemoci – WNS
- větrné elektrárny
- lov+přímé pronásledování


100 km
2005

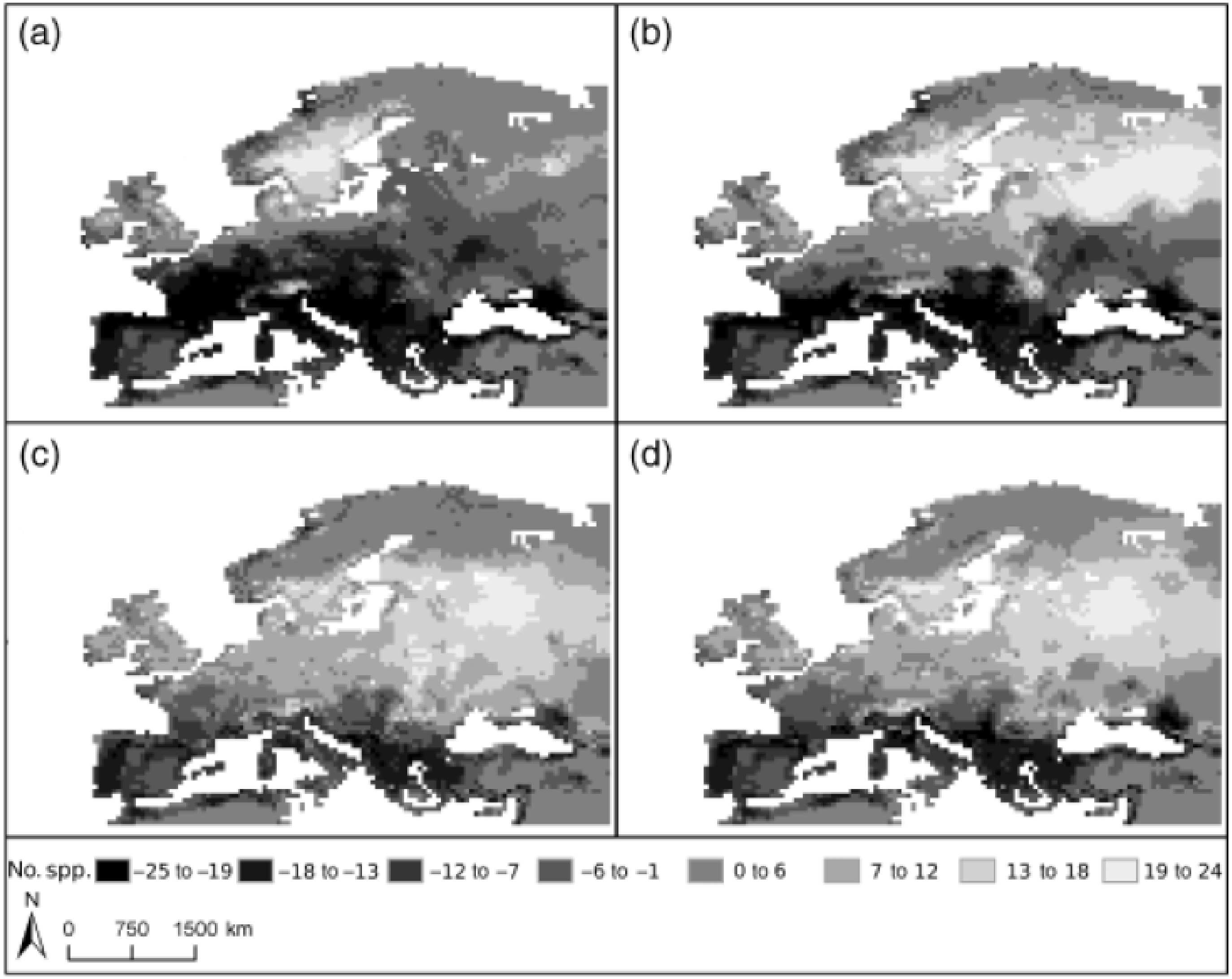


Fig. 8 Difference between present species richness and projections for 2090–2100 for scenarios (a) A1FI, (b) A2, (c) B1 and (d) B2.

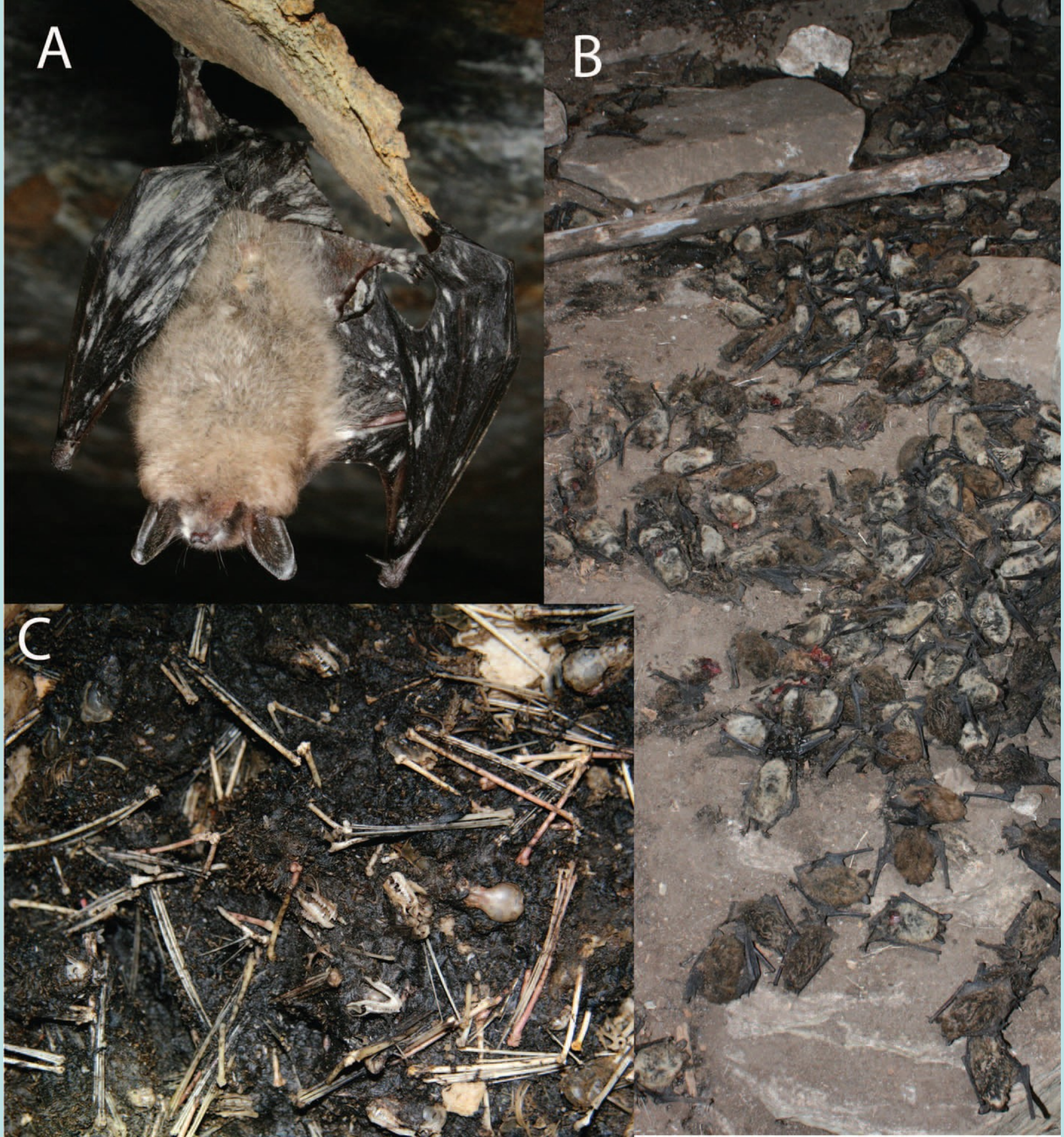
Vliv klimatických změn -Rebelo et al. 2010. Global Change Biol

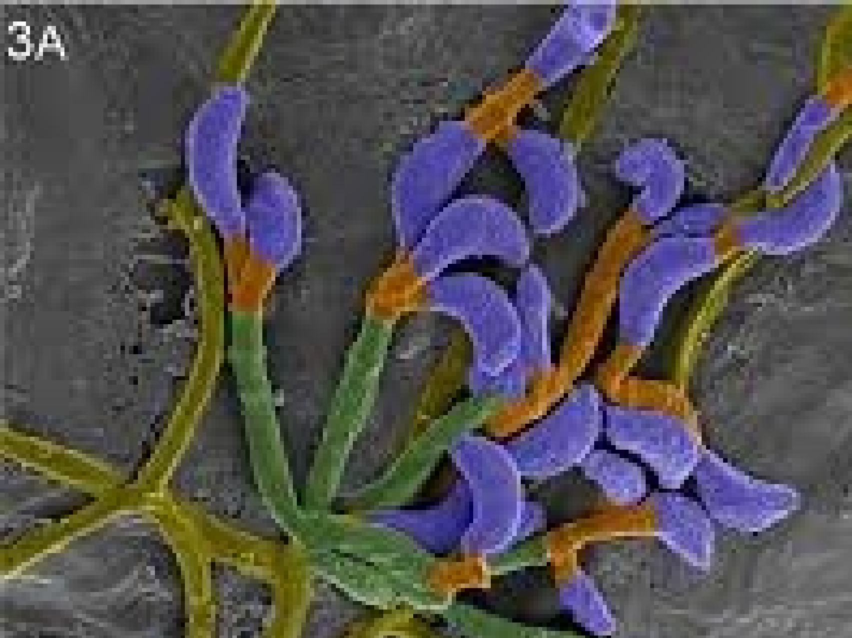
An Emerging Disease Causes Regional Population Collapse of a Common North American Bat Species

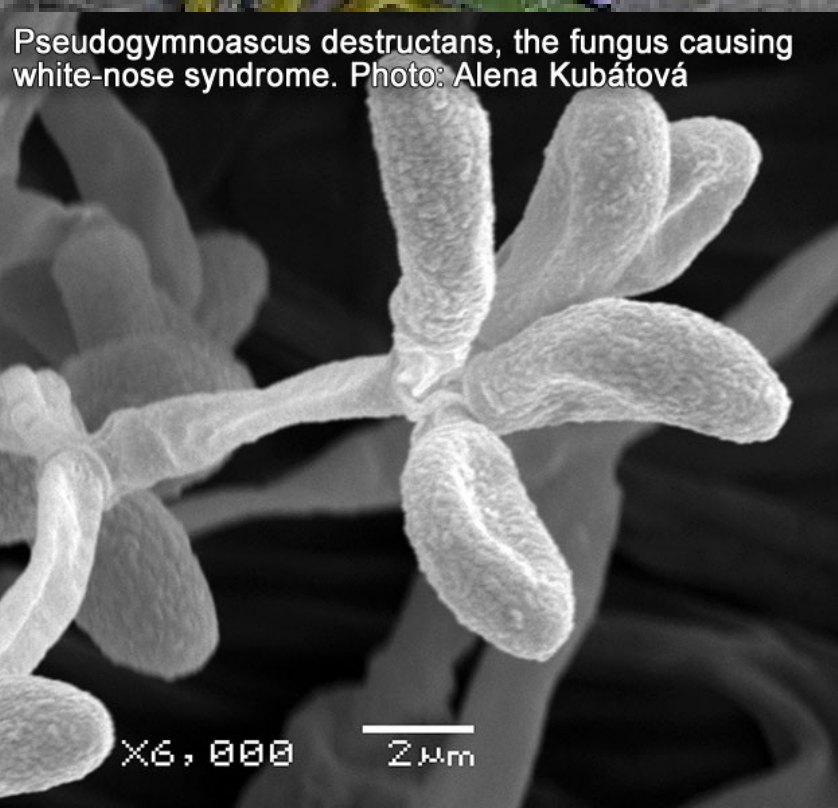
Winifred F. Frick,[1,2]* Jacob F. Pollock,[3] Alan C. Hicks,[4] Kate E. Langwig,[4,1] D. Scott Reynolds,[5,1] Gregory G. Turner,[6] Calvin M. Butchkoski,[6] Thomas H. Kunz[1]

Frick *et al*. 2010 *Science*

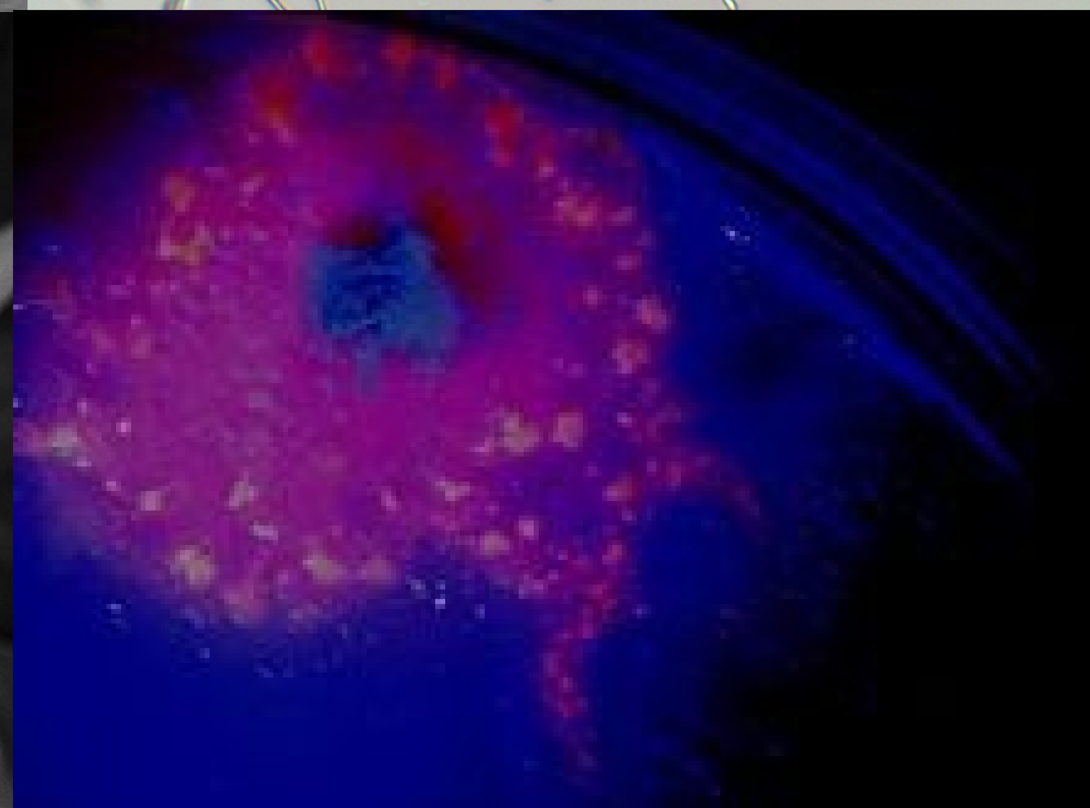
- https://www.agweb.com/article/bats-save-billions-in-pest-control-naa-chris-bennett/

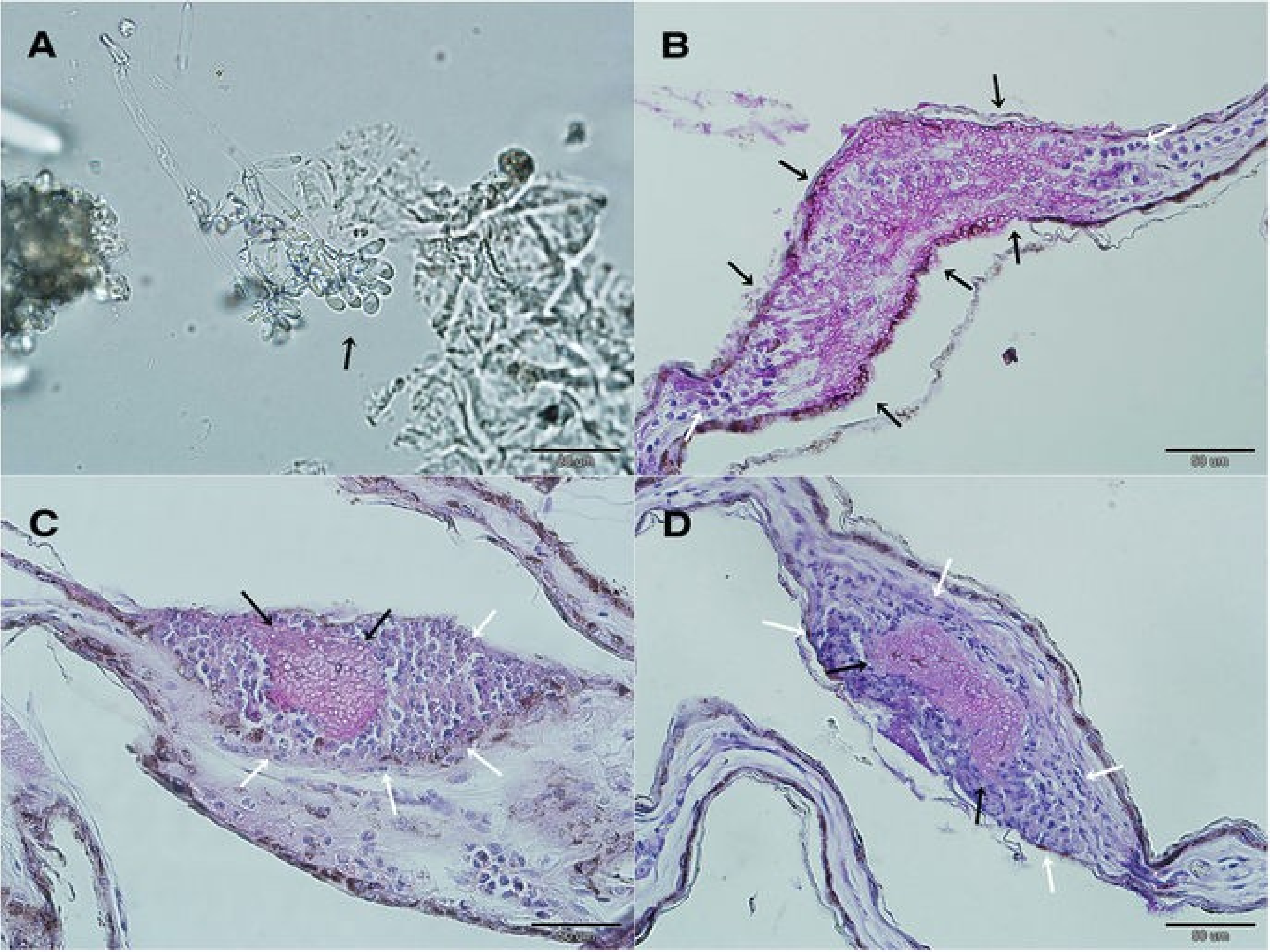

A
B
C

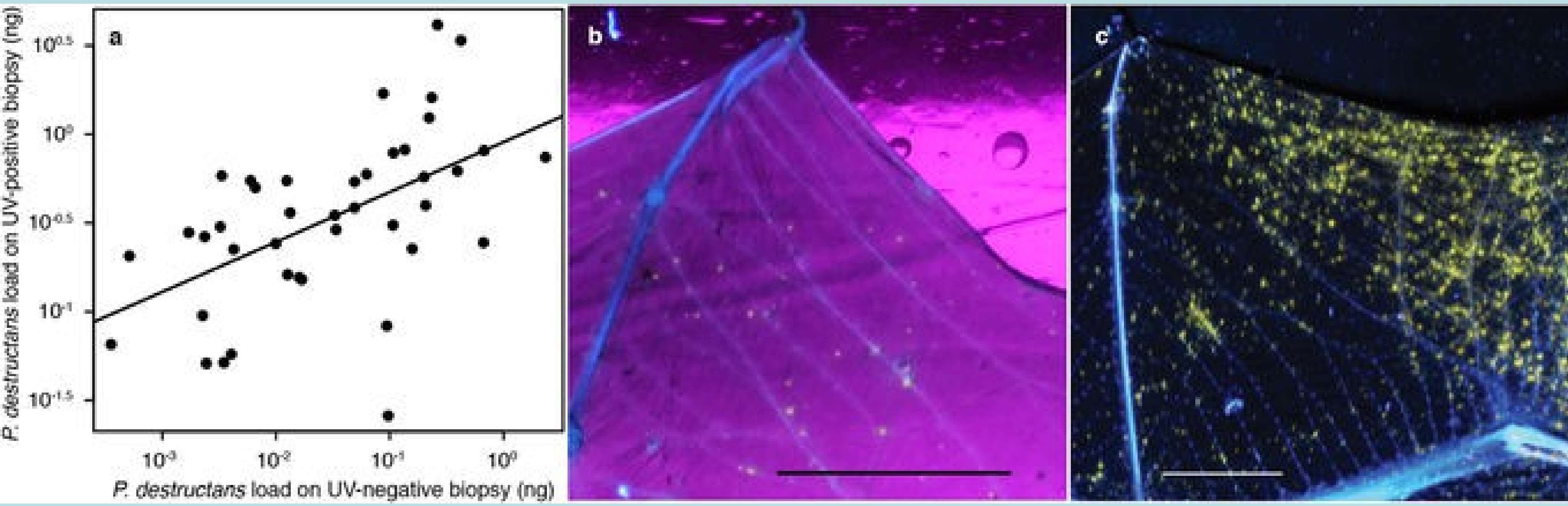


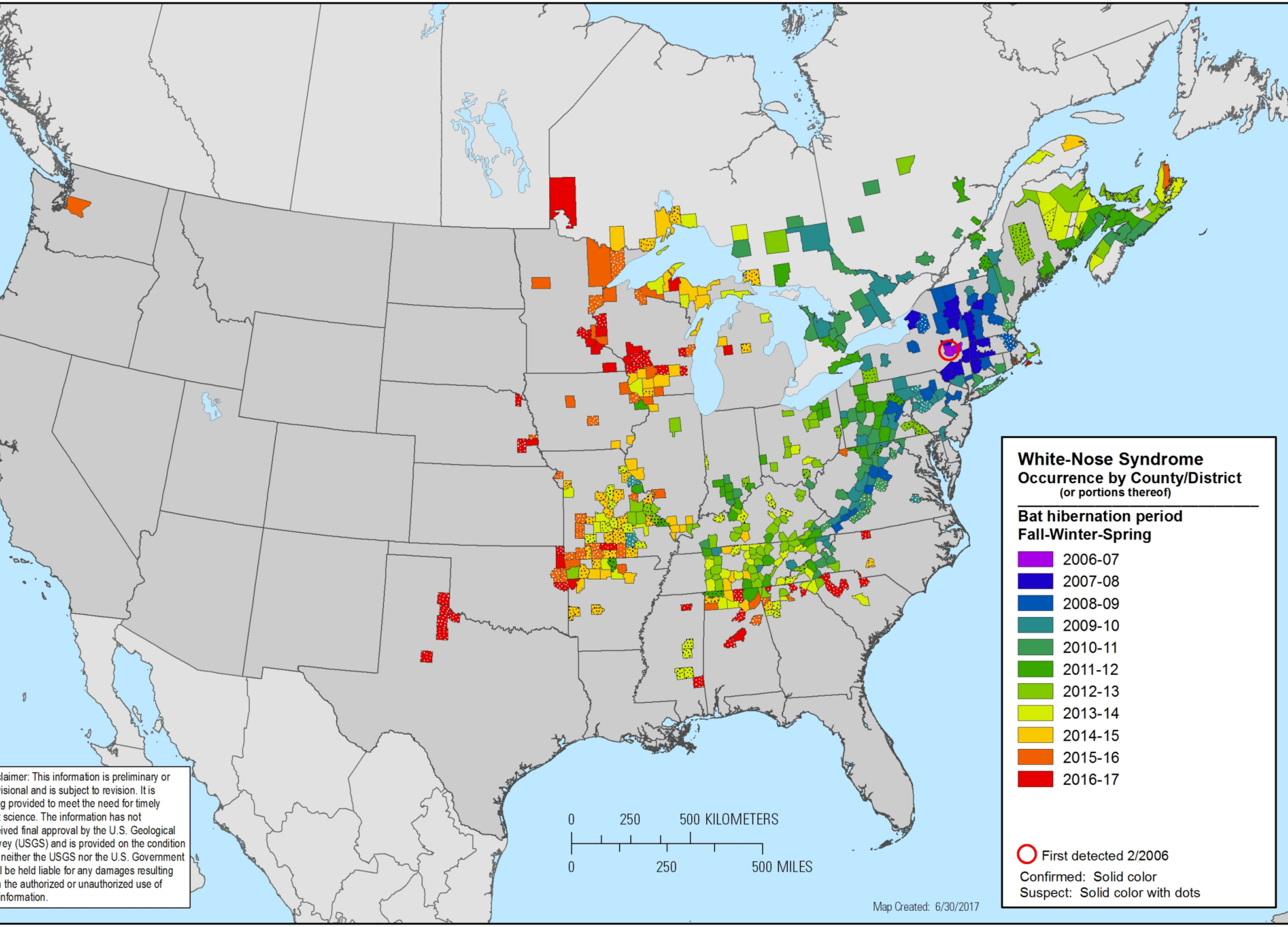


Pseudogymnoascus destructans, the fungus causing white-nose syndrome. Photo: Alena Kubátová




A
B
C
D


a
b
c
P. destructans load on UV-positive biopsy (ng)
P. destructans load on UV-negative biopsy (ng)
$10^{0.5}$
10^{0}
$10^{-0.5}$
10^{-1}
$10^{-1.5}$
10^{-3}
10^{-2}
10^{-1}
10^{0}



on: White-nose syndrome occurrence map - by year (2017). Data Last Updated: 6/30/2017. Available at: https://www.whitenosesyndrome.org/resources/map.

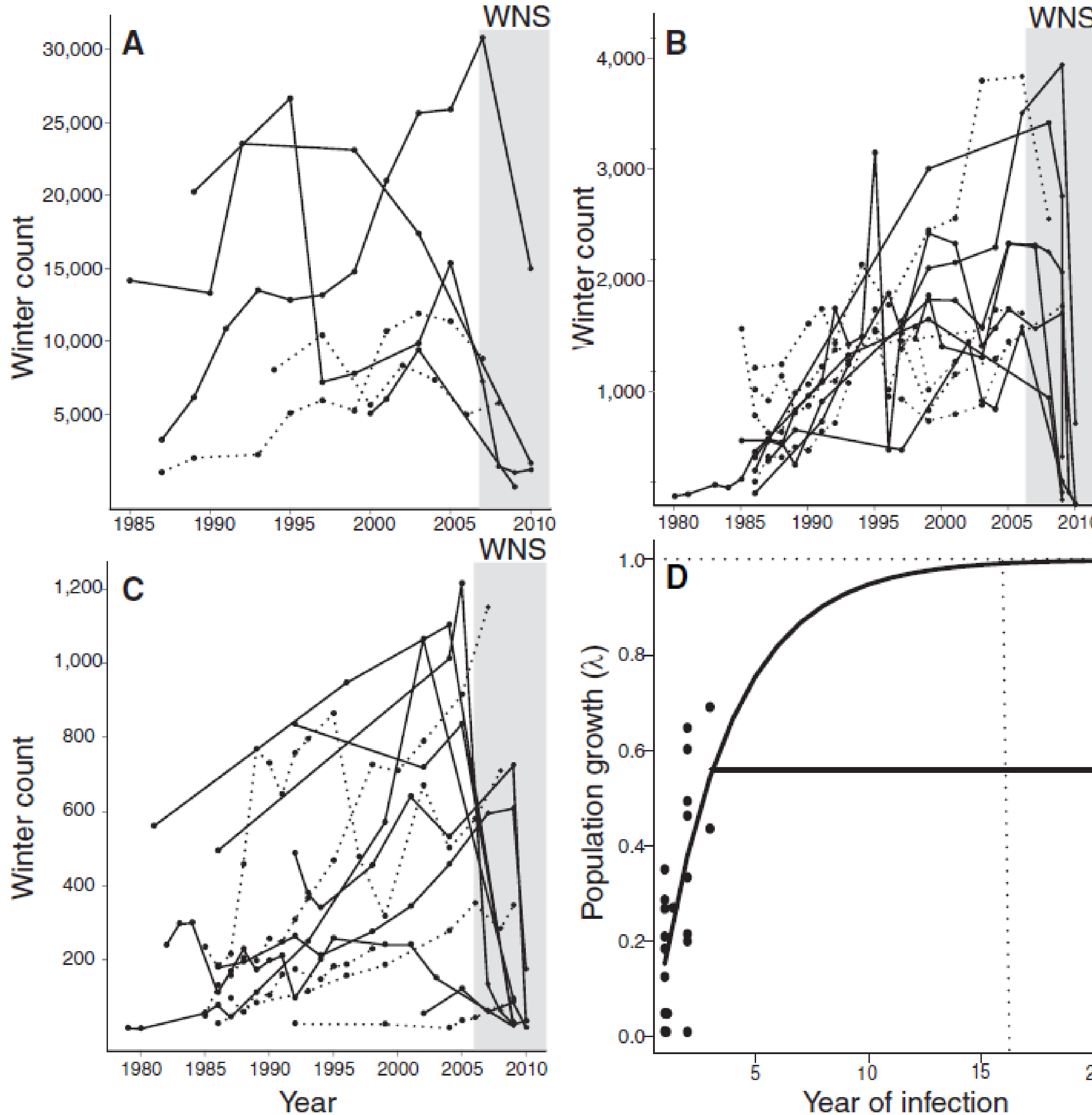


Fig. 3. (**A** to **C**) Population trends of little brown myotis over the past 30 years at (A) small (<1500 bats), (B) medium (<5000 bats), and (C) large (>5000 bats) hibernating colonies in the northeastern United States. Solid lines represent sites with bats infected with WNS; dotted lines represent uninfected sites. Hibernacula infected with WNS experienced a significant reduction in numbers as compared to the lowest available count from the past 30 years (Wilcoxon test = 190; $P < 0.002$). Large decreases in winter counts at a few hibernacula in the mid-1990s were related to winter flood events. (**D**) Population growth (λ) at hibernacula (black circles) by year since infection. The curved fitted line represents the nonlinear time-dependent model, showing amelioration of mortality from WNS until population growth reaches equilibrium at $\lambda = 1$ in 16 years since the first year of infection (vertical dotted line). The hockey-stick line represents declines from WNS persisting at the third-year mean of 45% per year, after a first-year decline of 85% and a second-year decline of 62%.

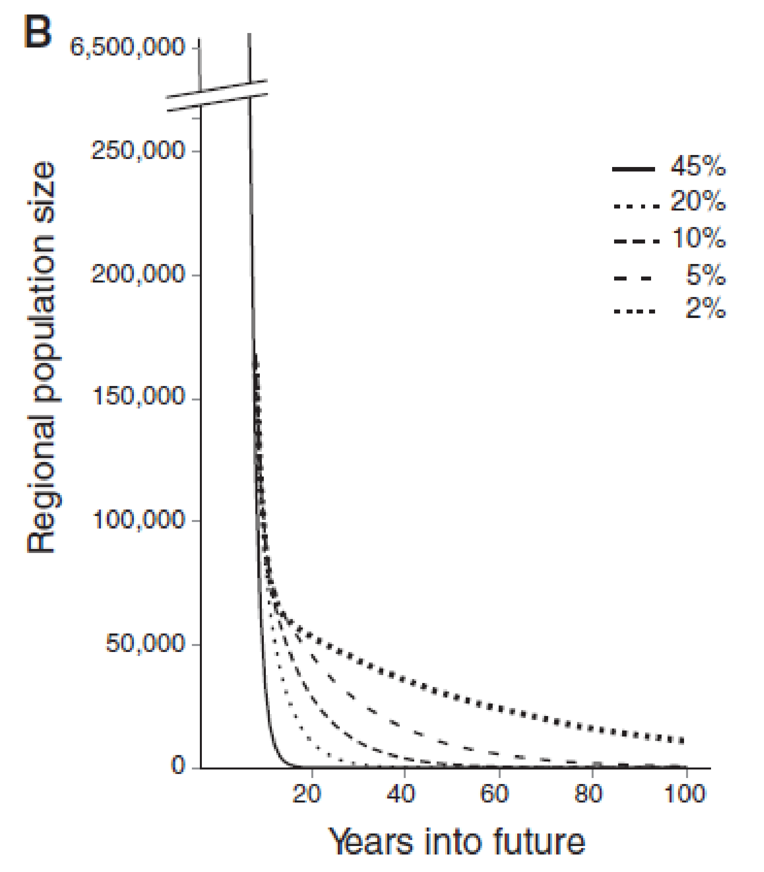


Fig. 4. (**A**) Cumulative probability of regional extinction of little brown myotis for five scenarios of time-dependent amelioration of disease mortality from WNS, based on matrix model simulation results. Each scenario represents predicted time-dependent declines for a specified number of years after infection and then holds the decline rate constant at either 45, 20, 10, 5, or 2% to demonstrate the impact of amelioration on the probability of extinction over the next 100 years. (**B**) Population size in each year averaged across 1000 simulations for each of the five scenarios of time-dependent amelioration of mortality from WNS.

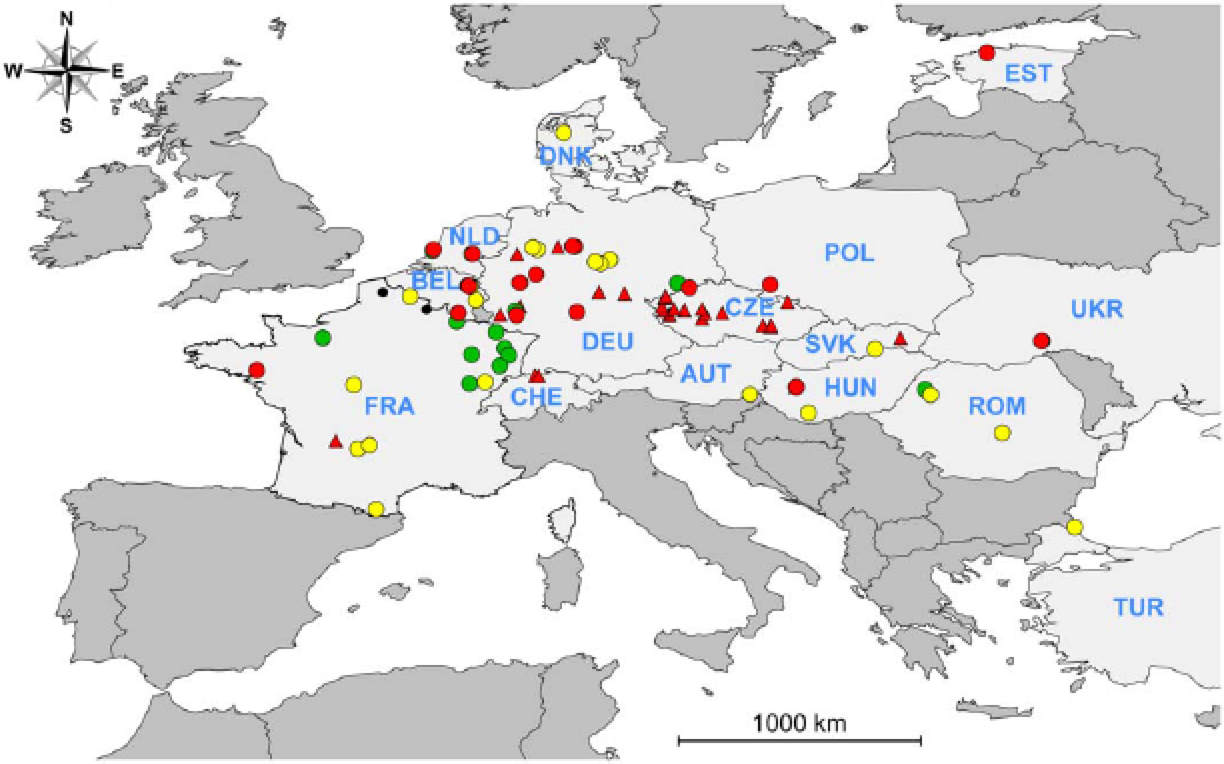


Figure 1. Distribution of confirmed and suspected records of *G. destructans* on hibernating bats in Europe. Data are presented for genetically confirmed records of *G. destructans* in red (circles, this study; triangles, published records), photographic evidence in yellow, visual reports in green. Dead bats from Northern France which culture and genetic analysis did not reveal the presence of *G. destructans* are depicted as black dots. Countries abbreviated names are as follows: AUT: Austria, BEL: Belgium, CHE: Switzerland, CZE: Czech Republic, DEU: Germany, DNK: Denmark, EST: Estonia, FRA: France, HUN: Hungary, NLD: Netherlands, POL: Poland, ROM: Romania, SVK: Slovakia, TUR: Turkey, UKR: Ukraine.
doi:10.1371/journal.pone.0019167.g001

Přímá likvidace netopýrů v souvislosti se škodami na zemědělských plodinách: nejlépe zdokumentováno v Izraeli: fumigace jeskyní, likvidace většiny hmyzožravých netopýrů, cílový druh exterminačních praktik bez problému přežil


ve 3 úktytech v oáze Dachla nalezeny
kadavery min. 1500 ex. = 1/3 populace!!!)

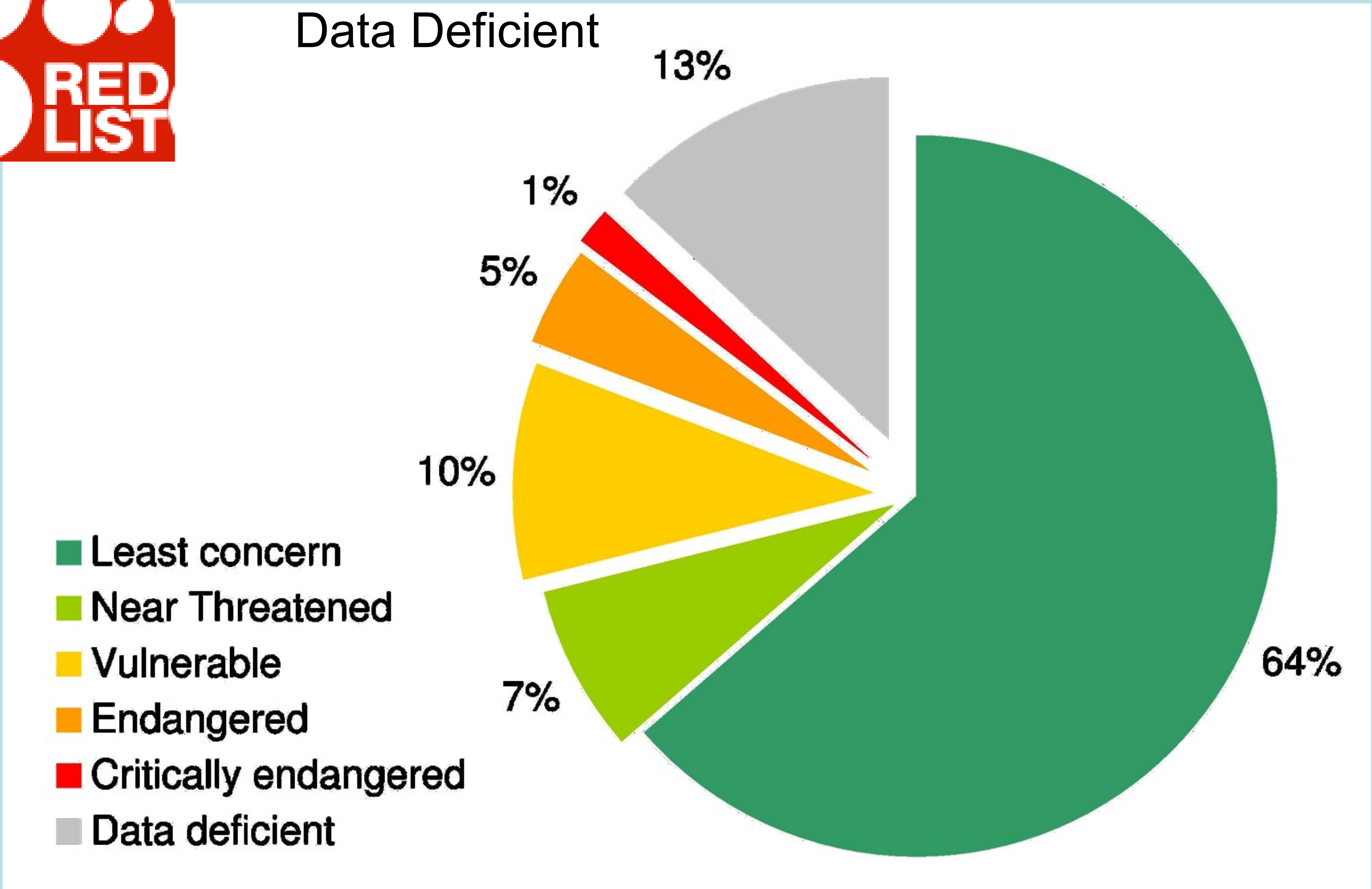

มอก.56-2533
120049

Table 2 Geographical distribution of reports on bat consumption and any perceived problems. This is based on 138 records, including questionnaires (Appendix 1) returned and anecdotal information provided. Only regions where there was evidence of significant consumption of bats have been included in our analysis.

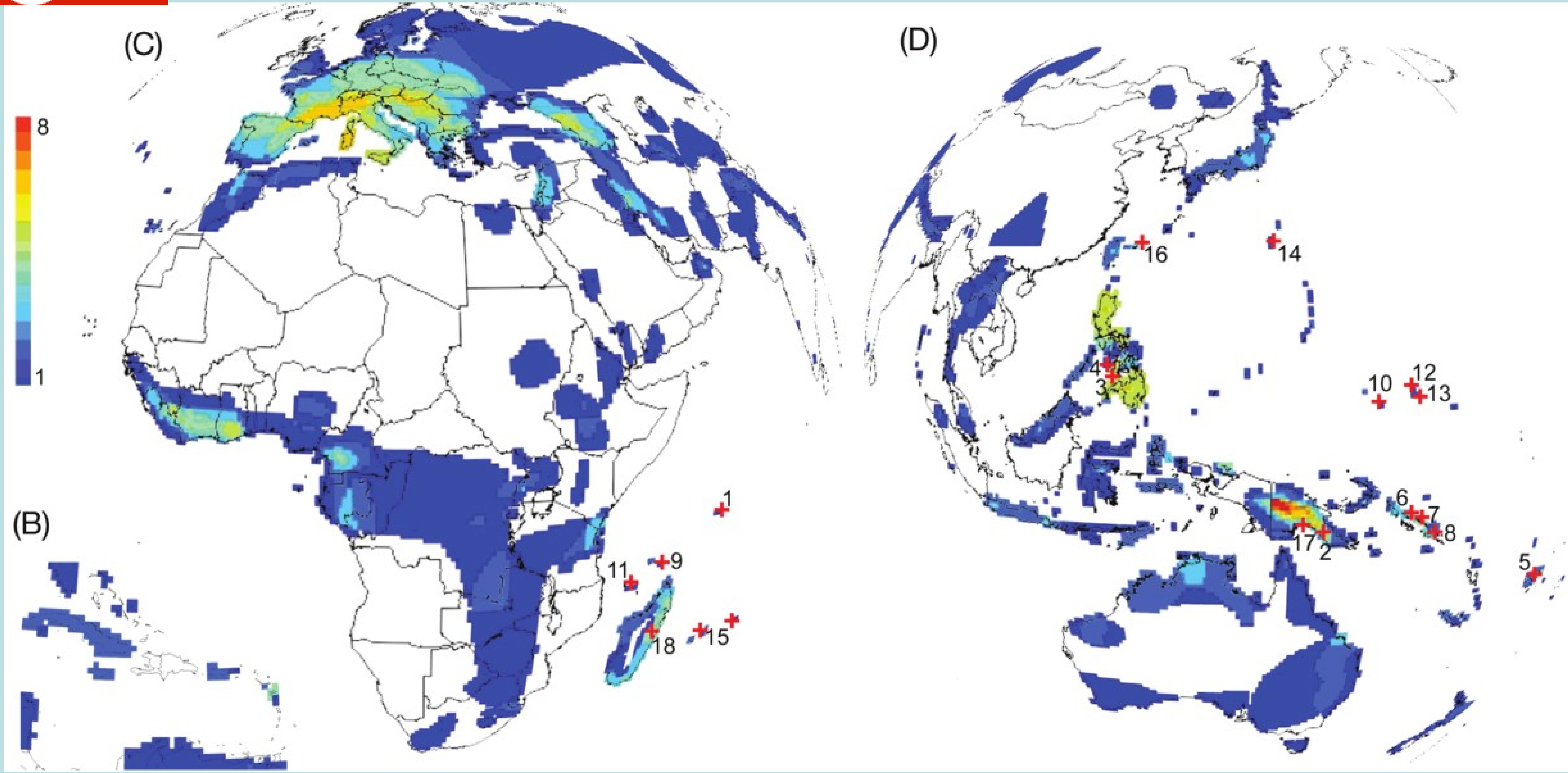
		Consumption reported		Perceived problem?	
Geographical region	Total no. of reports	Yes	No	Yes	No
Regions included					
South-East Asia	39	39	0	24	15
East & South Asia	13	8	5	2	11
Pacific Islands	6	4	2	4	2
Western Indian Ocean	14	11	3	5	9
Sub-Saharan Africa	25	16	9	9	16
South America	12	2	10	0	12
Regions excluded					
Eurasia*	15	0	15	0	15
North Africa	2	0	2	0	2
Arabian Peninsula	1	0	1	0	1
Australia	1	1	0	0	1
New Zealand	2	0	2	0	2
North America	1	0	1	0	1
Central America	5	1	4	0	5
Caribbean	2	0	1	0	1

*Includes all of Europe, Russia and former Soviet Republics

Mickleburgh et al. 2009. Bats as bushmeat: a global review. Oryx

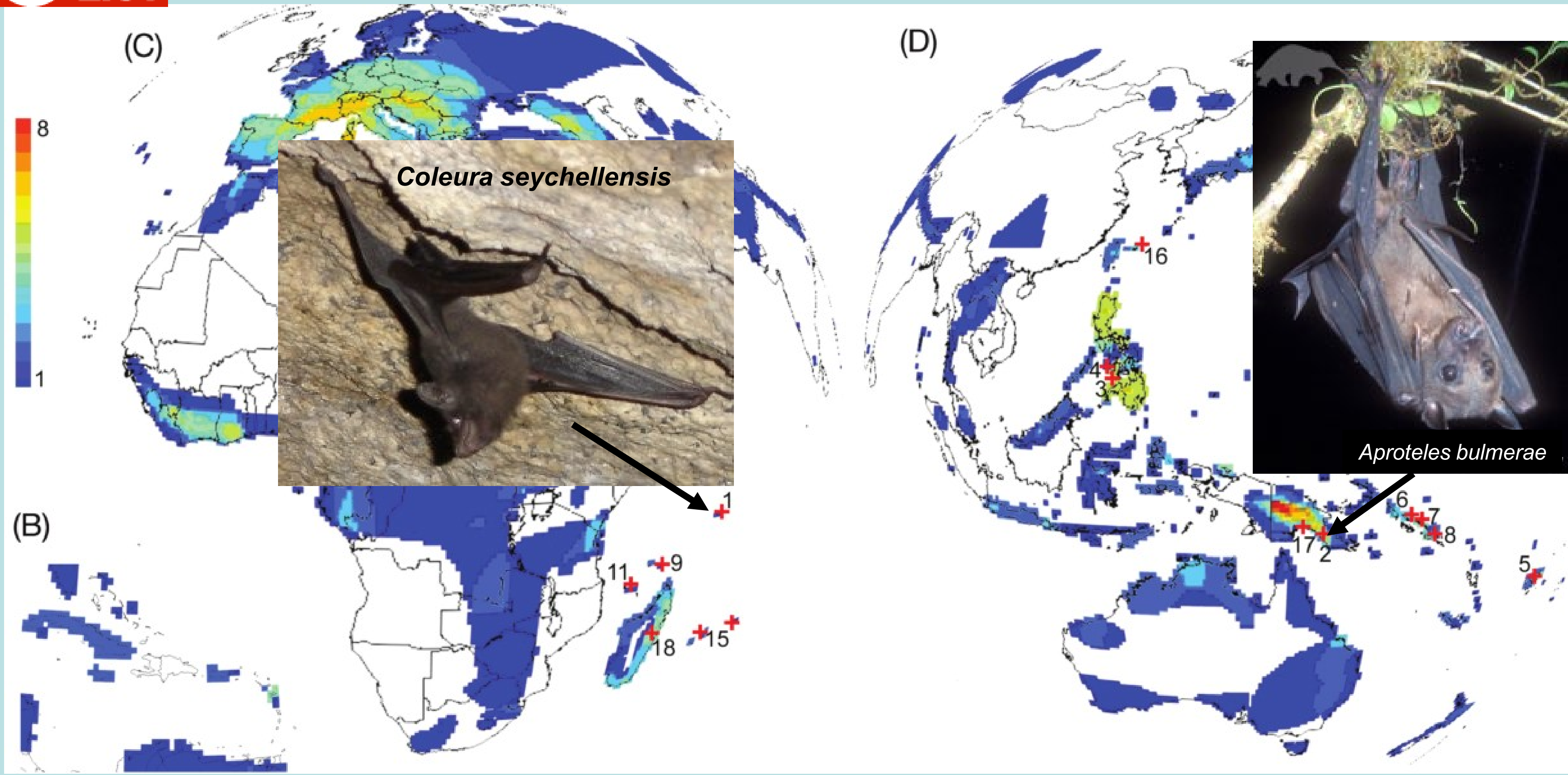


Ochranářský status letounů (IUCN) – Chiroptera Specialist Group



Species richness of threatened bats. Crosses represent critically endangered species.

Jones *et al*. 2009 *in: Island Bats: Ecology, evolution and Conservation*



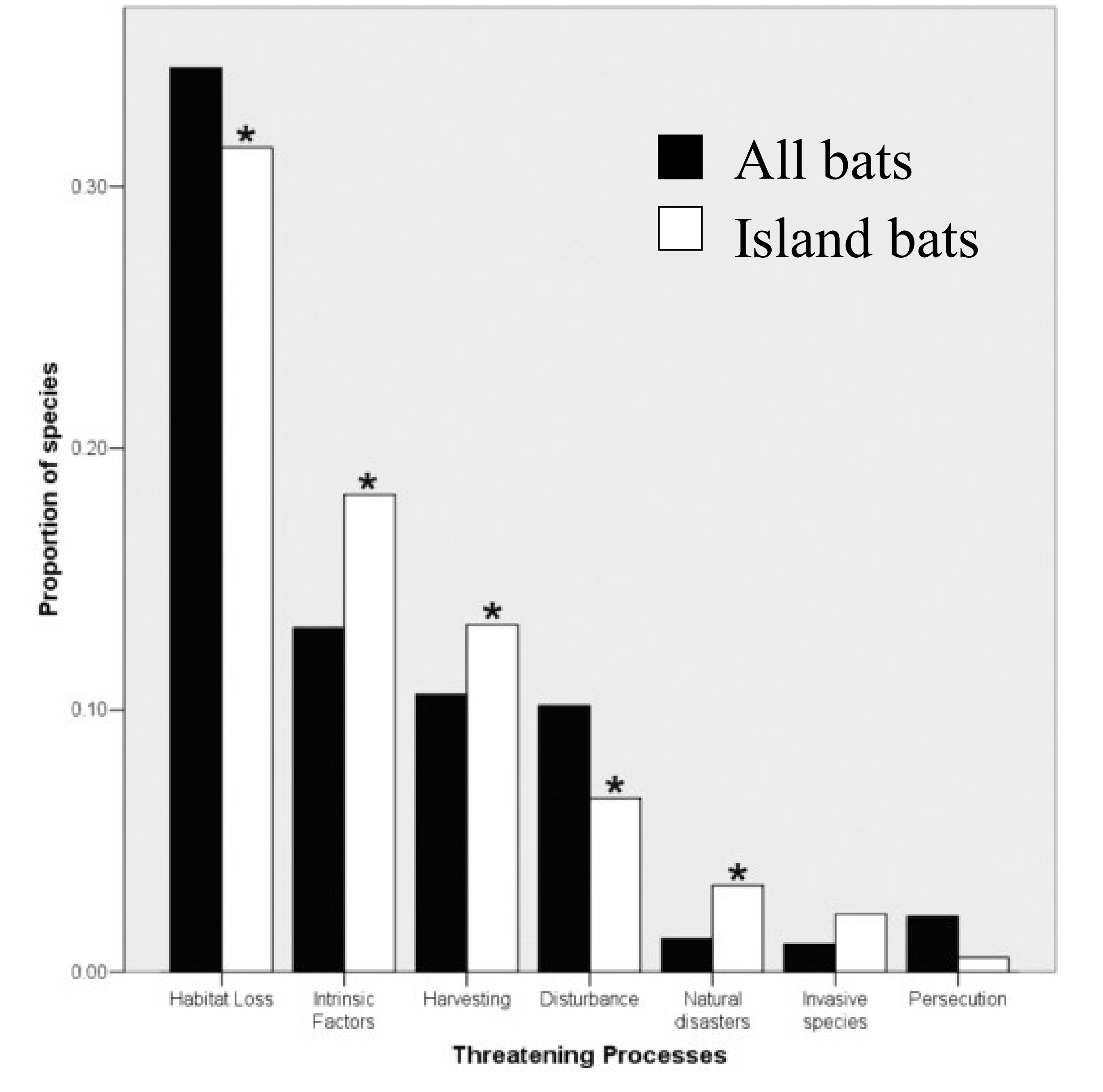
Species richness of threatened bats. Crosses represent critically endangered species.

Jones *et al*. 2009 *in: Island Bats: Ecology, evolution and Conservation*

Histiotus alienus (Strange big-eared brown bat)

Myotis insularum (Insular myotis)

Nycteris madagascarienis (Madagascar slit-faced bat)



Jones *et al*. 2009 *in: Island Bats: Ecology, Evolution and Conservation*

Species that are likely threatened

Species	Distribution	IUCN Status	Probability of Threatened
Pteropus griseus (Gray Flying Fox)	Indonesia	DD	0.994
Myotis insularum (Insular Myotis)	Samoa	DD	0.982
Pteropus insularis (Ruck Flying Fox)	Micronesia	DD	0.975
Rhinolophus keyensis (Kai Horseshoe bat)	Indonesia	DD	0.959
Otomops formosus (Java Giant Mastif bat)	Indonesia	DD	0.923
Cynomops paranus (Brown dog-faced bat)	South & Central America	DD	0.871
Pteropus lombocensis (Lombok Flying Fox)	Indonesia	DD	0.836
Nycteris madagascariensis (Slit-Faced bat)	Madagascar	DD	0.694
Tadarida insignis (East Asian Free-tailed bat)	China, Japan	DD	0.663
Myotis oreias (Singapore Whiskered bat)	Singapore	DD	0.653
Myotis anjouanensis (Anjouan Myotis)	Comoros	DD	0.622

Jones & Safi in press *Phil. Trans. Royal Soc.*

Historické a současné extinkce letounů

Recent bat extinction

- 12-18 species of bats extinct within last 300 years (most represented by modern museum specimens)
- 14-17 additional species of bats extinct during the Holocene (subfossils, rock art)
- Extinction rate: 2% of described Holocene bat species
- Extinctions likely underestimated: extremely poor historical sampling and unresolved taxonomy
- Documented extinctions concentrated in Polynesia, Micronesia, Indian Ocean, Caribbean
- Some extinctions on continents (*Desmodus, Styloctenium*)

Every specimen counts

FAMILY PTEROPODIDAE

- ***Pteropus allenorum*** **(Samoa)** **1856**
- ***Pteropus brunneus*** **(eastern Queensland)** **1874**
- ***Pteropus coxi*** **(Samoa)** **1840**
- ***Pteropus loochooensis*** **(Ryukyu)** **pre 1870**
- ***Pteropus pilosus*** **(Palau)** ***circa*** **1870**
- ***Pteropus subniger*** **(Mascarenes)** ***circa*** **1870**
- ***Pteropus tokudae*** **(Guam)** **1966**

FAMILY VESPERTILIONIDAE

- ***Myotis insularum*** **(Samoa)** **1860s**
- ***Nyctophilus howensis*** **(Lord Howe)** **1887**
- ***Pipistrellus murrayi*** **(Christmas Island)** **2009**
- ***Scotophilus borbonicus*** **(Reunion, Madagascar)** **1868**

FAMILY MYSTACINIDAE

- ***Mystacina robusta*** **(New Zealand)** **1967**

Recent extinctions

How many species of bats have become extinct in recent centuries (last 200-300 years)?

Resources
- Museum specimens
- Published accounts

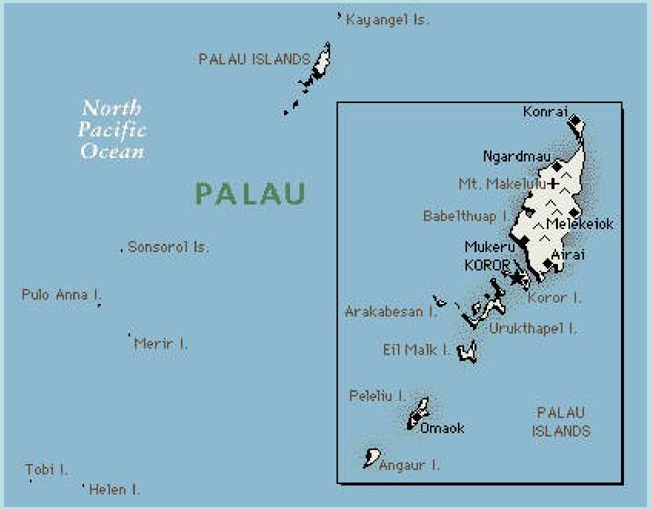
Challenges
- Taxonomic resolution
- Monitoring

Pteropus subniger Kerr, 1792

- Mauritius and Reunion
- Small flying fox
- Forest-dwelling bat
- Extinct by 1870s

Pteropus pilosus Andersen, 1908

- Known only by a single specimen from Palau
- Large flying fox



Pteropus allenorum

Single specimen at ANSP

Collected from Apia, Upolu in 1856

Small toothed

Brown with a gold–brown mantle

Pteropus coxi

- Wilkes' U.S. Exploring Expedition of 1839 – 1842

- Two specimens with consecutive catalogue numbers; collected along with specimens of *P. samoensis*

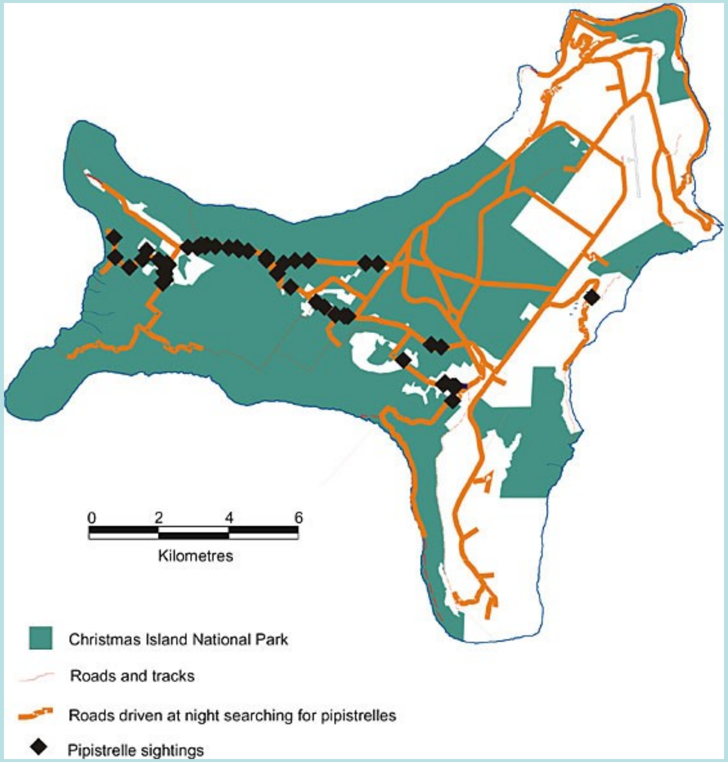
- Marked only as from "Samoan Islands"

- Skins cannot be found in the collection

Pteropus tokudae

- Discovered in the 1930s
- Very small flying fox
- 3 specimens known
- Apparently extinct by the 1970s

Pipistrellus murrayi



RESEARCH ARTICLE

Flying foxes create extensive seed shadows and enhance germination success of pioneer plant species in deforested Madagascan landscapes

Ryszard Oleksy[1], Luca Giuggioli[1,2], Thomas J. McKetterick[2], Paul A. Racey[3], Gareth Jones[1]*

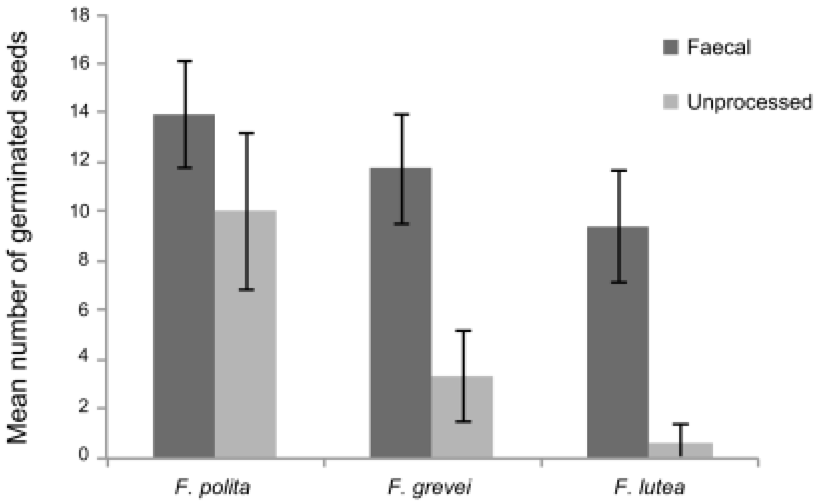


Fig 1. Germination success of fig seeds on filter paper. Mean germination success for *Ficus polita, F. grevei and F. lutea* for faecal (dark shading) and for unprocessed seeds removed from ripe fruits (light shading) sown on filter paper. There were 15 replicates of 20 seeds/ treatment. The error bars are standard deviations.

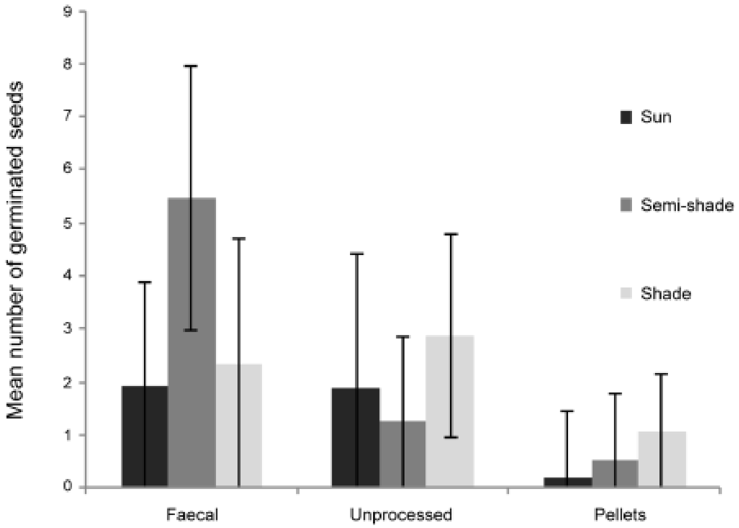


Fig 2. Germination success of fig seeds in semi-natural conditions. Mean germination success of *Ficus polita* faecal, unprocessed and from rejecta pellet seeds under three different light intensities. Each treatment was replicated 15 times with 20 seeds/replicate (2,700 seeds tested). The bars represent standard deviations.

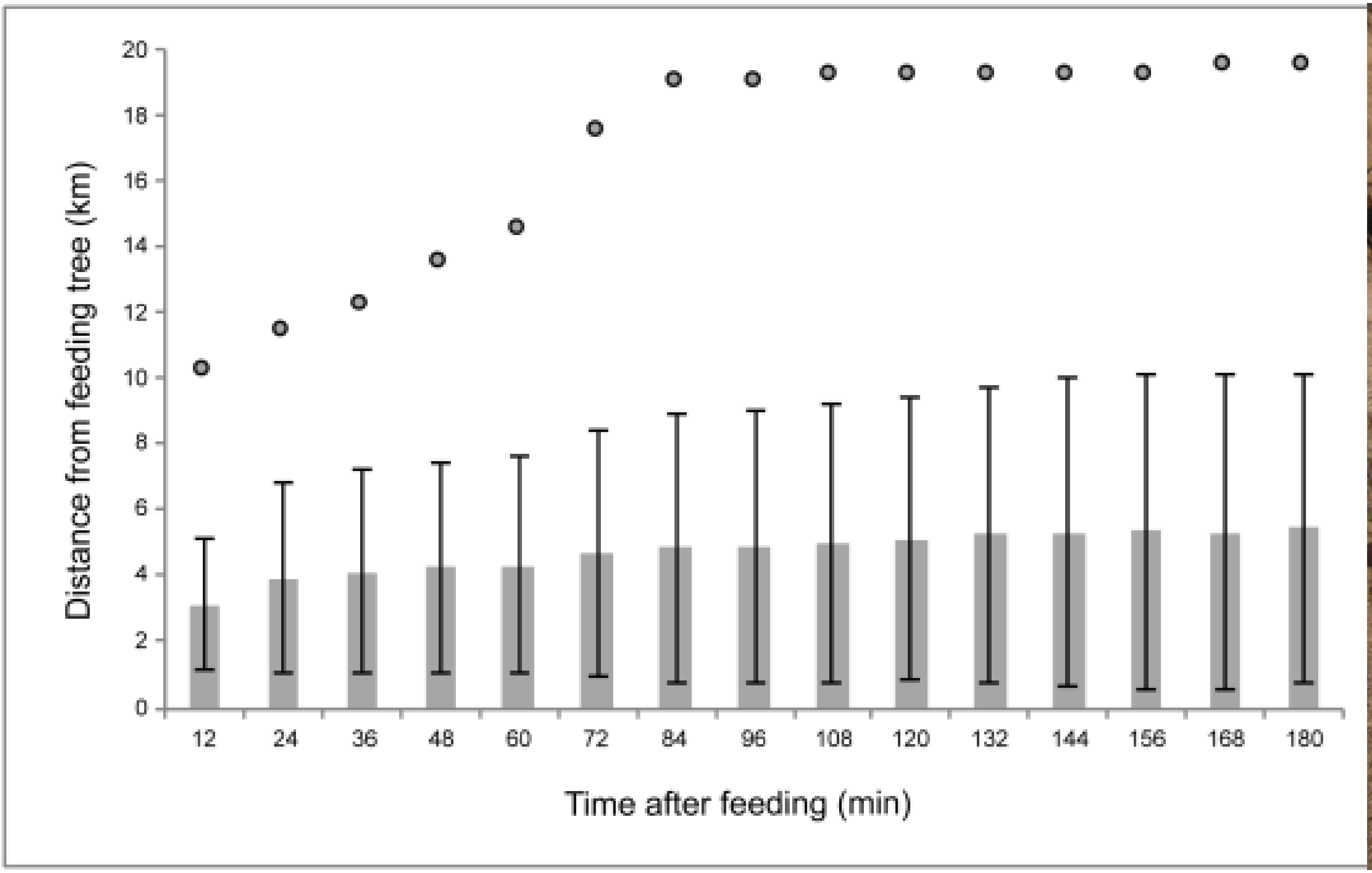


Fig 4. Travel distances of Madagascan flying foxes. Distances travelled by 11 *Pteropus rufus* bats from fig trees for up to 3 h after feeding (the time in which most droppings containing more than 25 seeds were produced in our GRT study–see Fig 3). The position of the bat was considered every 12 min as a straight line along its flight path in relation to the feeding tree it used. The bars represent average recorded distance from the feeding sites (n = 71) with the standard deviation. The circles indicate the maximum distance recorded.

BATS AND LIGHTING IN THE UK

Bats and the Built Environment Series

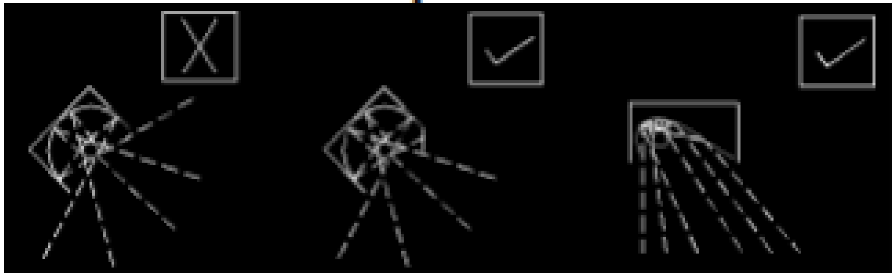
This document is aimed at lighting engineers, lighting designers, planning officers, developers, bat workers and anyone specifying lighting. It is intended to raise awareness of the impacts of lighting on bats and mitigation is suggested for various scenarios. It also offers an explanation of the facts associated with the lighting industry for the benefit of bat workers.

This is a working document and as such the information contained will be updated in line with advances in our knowledge both into the impact on bats and also to reflect the advances in technology available in the lighting industry.

The information provided here is believed to be correct. However, no responsibility can be accepted by the Bat Conservation Trust, the Institution of Lighting Engineers or any of their partners or officers for any consequences of errors or omissions, nor responsibility for loss occasioned to any person acting or refraining from action as a result of information and no claims for compensation for damage or negligence will be accepted.

3. FLOODLIGHTING OF SPORTS OR EVENTS

The use of asymmetric beam floodlights (as opposed to symmetric) orientated so that the glass is parallel to the ground will ensure that the light is cast in a downward direction and avoids horizontal spill.



Legal requirements for lighting

There is no legislation requiring an area or road to be lit.

The Building Regulations specify that 150 W is the maximum for exterior lighting of buildings but this does not apply to private individuals.

Roads "a serious threat" to rare bats

Roads present a serious threat to bat populations, indicating that protection policies are failing.

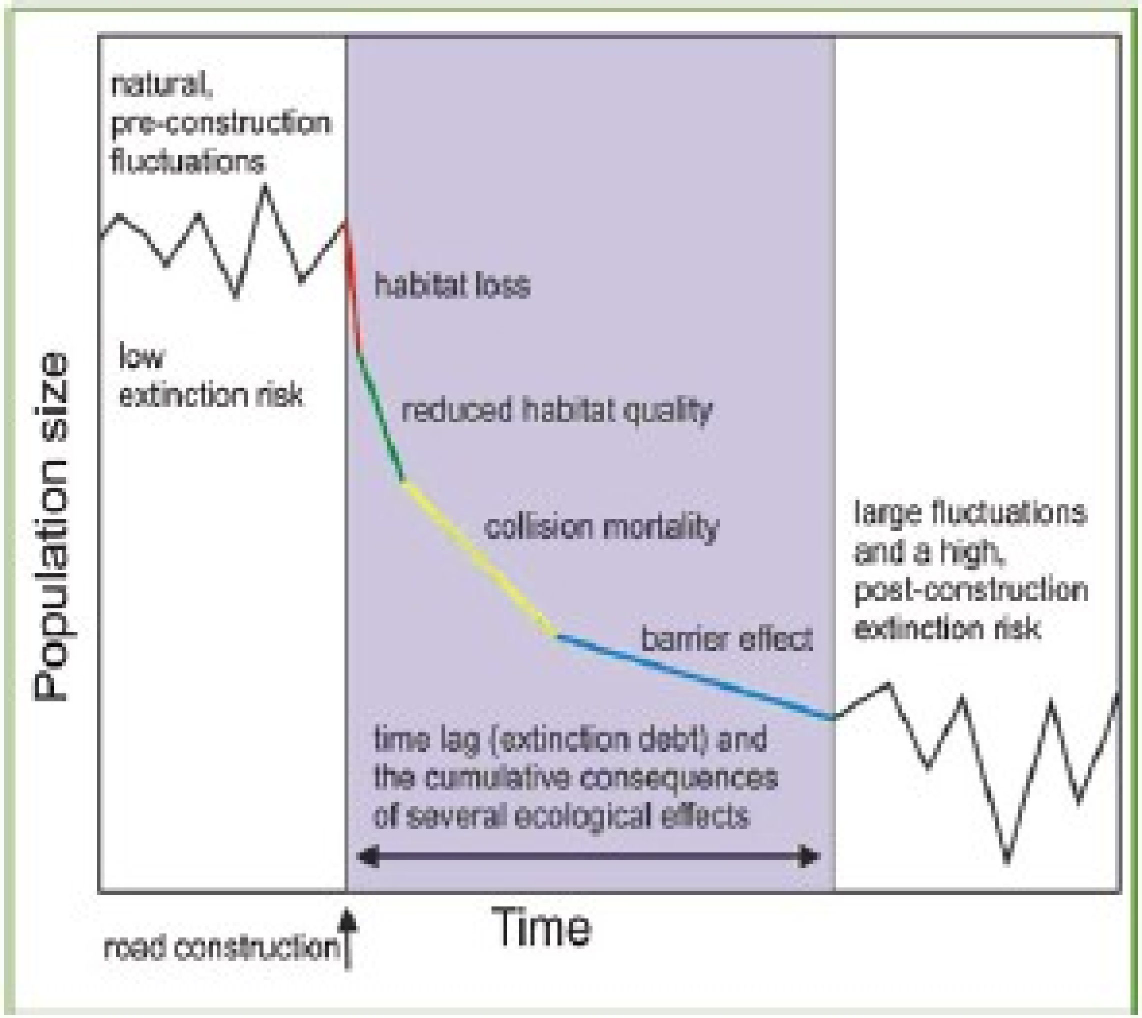
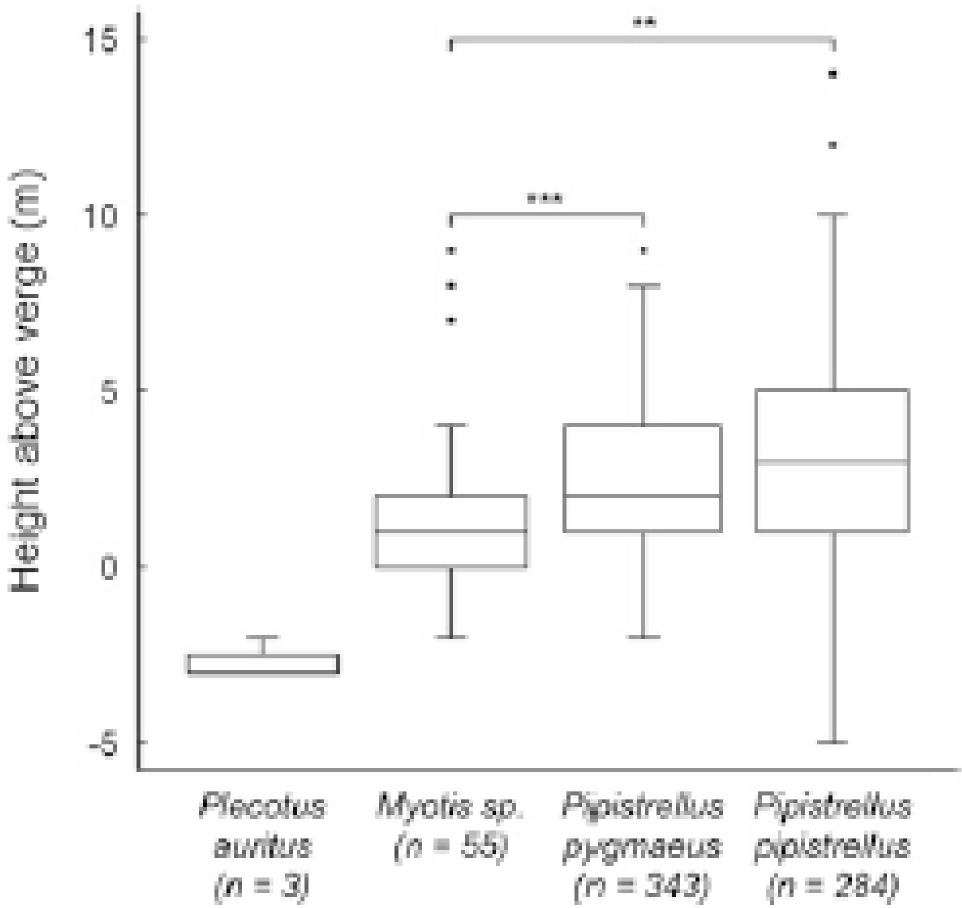


Fig. 3.4 The multiple causes of bat population reduction by roads and the delayed response (extinction debt). Adapted from Forman et al. (2003)

Fig. 3.2 Boxplot of flight height above verge height of identified crossing bats. Median with upper and lower quartiles. Significant differences shown for *Myotis* and *Pipistrellus* species $^{**}P < 0.0005$, $^{***}P < 0.0001$. Verges are elevated on either side of the road and are above road height, therefore negative values indicate bats flying across the road below the height of the verge. From Berthinussen and Altringham (2012b)




A
B
C
Colony BE
Colony GB2
Colony KL
Colony SH
Colony TUE
Colony WF
Commuting route MB021
Underpass
Motorway
High traffic road
Low traffic road
Forest
0
1
2
3
4
5 Kilometers

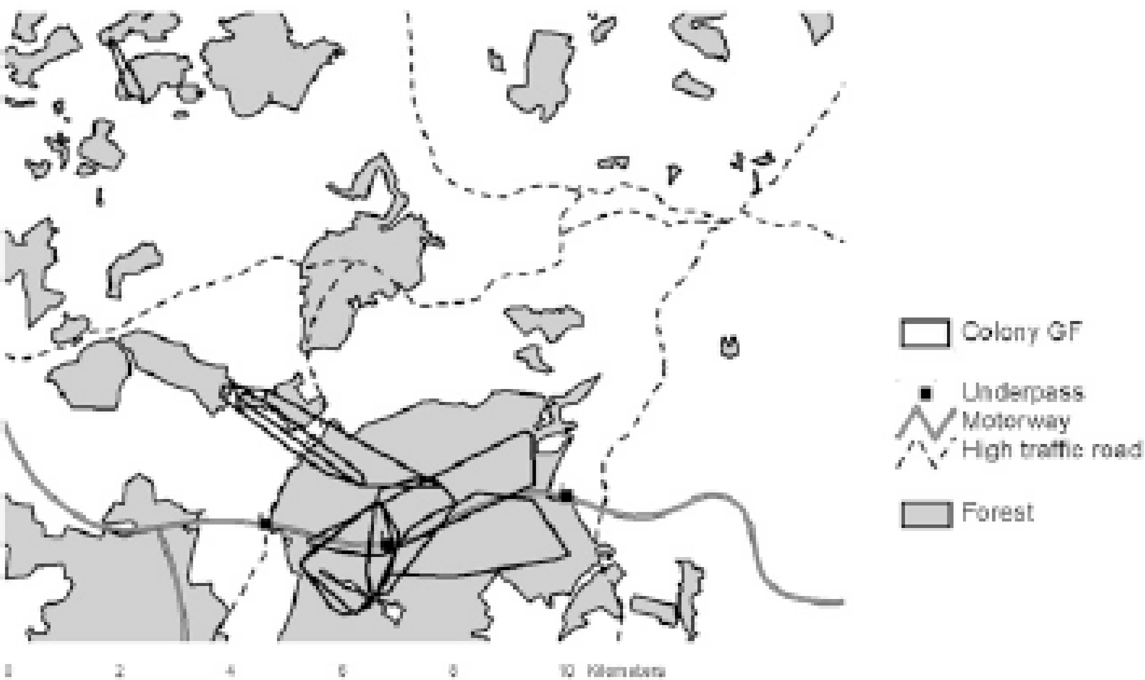

Colony GF
Underpass
Motorway
High traffic road
Forest
0
2
4
6
8
10 Kilometers

Fig. 3.5 The most common bat gantry design in the UK—steel wires with plastic spheres at intervals that are intended to be acoustic guides for bats

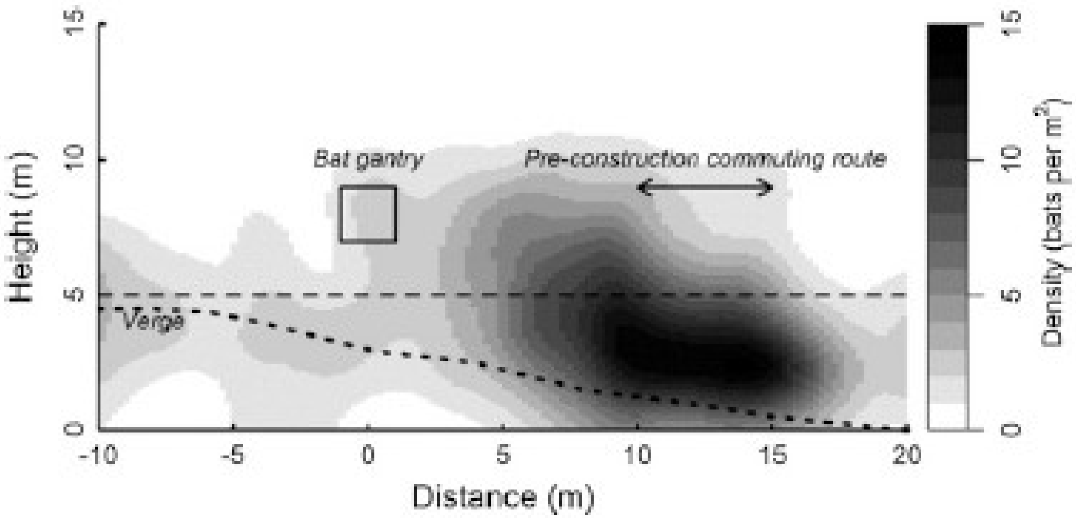


Fig. 3.6 Bat crossing activity at a 'bat gantry' that had been in place for nine years. Gaussian kernel and bandwidth of 1 m used (n = 1078). The gantry is located at distance 0 m on the x-axis, with distance from the gantry increasing to the *left* and *right*. The height of the gantry is marked by the *square* at 0 m, and the pre-construction commuting route is 10–15 m to the *right*. 'Unsafe' crossing heights are located below the *dashed line*, which is the maximum vehicle height in Europe. The *dotted line* marked verge shows the decrease in verge height above the road from *left* to *right*. From Berthinussen and Altringham (2012b)

Why wind turbines endanger bats

Researchers have known for a while that wind turbines are a bigger threat to bats than to birds. About 90 percent of the bats killed near turbines in a recent study showed signs of internal hemorrhaging caused by quick changes in air pressure, known as barotrauma.

1. Bats should be able to avoid the blades of turbines using echolocation. In the study, only half of the dead bats had been hit by blades, and they may have been hit after they hemorrhaged.

2. Turning turbines create low-pressure areas near the tips of the blades. When a bat flies into these areas, the air in its lungs is at a higher pressure than the surrounding air. It expands and can rupture tiny vessels around the lungs. In effect, the bat's lungs explode.

3. The effect is similar to a scuba diver who gets the bends when the air pressure in his lungs has not had a chance to equalize with the pressure at the surface. Birds do not have the same problems. Their lungs are different than those of mammals.

Sources: Current Biology, National Geographic, Science Daily

Press graphic by Tim Faherty

Ochranářské aktivity

BAT CONSERVATION INTERNATIONAL

Bat Conservation Trust

BatLife Europe

Lubee Bat Conservancy
Saving bats. Conserving ecosystems

ČESON
Česká společnost pro ochranu netopýrů

EUROBATS

Year of the Bat 2011-2012

Společnosti zabývající se ochranou a výzkumem netopýrů dnes prakticky v každé zemi

Kromě praktické ochrany je nejdůležitější aktivitou **OSVĚTOVÁ ČINNOST**

Česká společnost pro ochranu netopýrů

založena 1990
cca 120 členů

- výzkum a ochrana netopýrů
- osvětové akce (Evropská noc pro netopýry...)
- medializace problematiky
- vydávání osvětových materiálů (letáky, plakáty atd.
- časopis Vespertilio
- realizace praktických opatření

•nejčastěji řešené otázky:
- co s nalezeným netopýrem
- mámě v domě netopýry a chceme se jich zbavit
- jak si počínat při rekonstrukci domu, kde jsou netopýři
- správní řízení

Netopýři, monitoring a ochrana netopýrů - Mozilla Firefox

Soubor Úpravy Zobrazení Historie Záložky Nástroje Nápověda

Netopýři, monitoring a ochrana netopýrů +

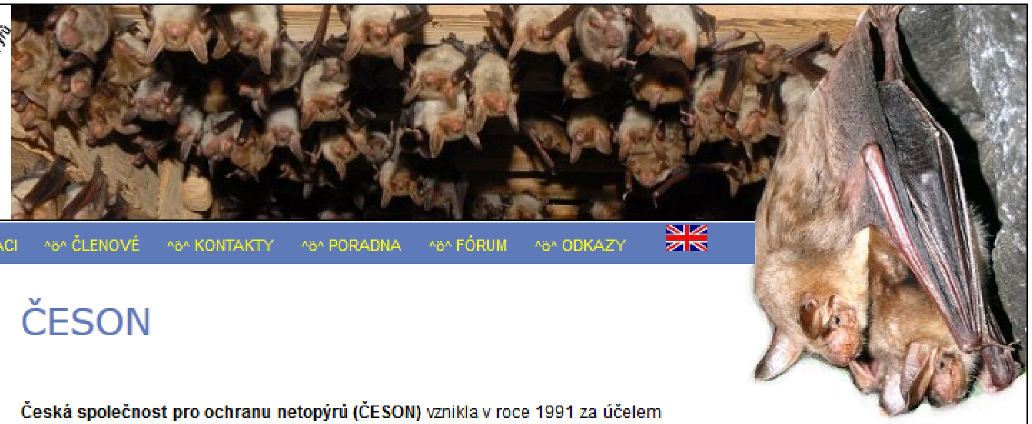
www.ceson.org

AOL Web Search

Nejnavštěvovanější Jak začít Přehled zpráv Český rozhlas 1 - Radi... Google

ČESON

Česká společnost pro ochranu netopýrů



^ö^ ÚVOD ^ö^ O ORGANIZACI ^ö^ ČLENOVÉ ^ö^ KONTAKTY ^ö^ PORADNA ^ö^ FÓRUM ^ö^ ODKAZY

česky / english

Činnost

- AKTUALITY
- Akce pro veřejnost
- Projekty
- Vespertilio
- Kroužkovací databáze
- Monitoring populací
- Monitoring paneláků
- Rekonstrukce budov
- Echolokace
- Péče o úkryty
- Fotogalerie
- Propagační materiály
- Dokumenty
- Lokality (hledání)
- Rok netopýra 2011-12

ČESON

Česká společnost pro ochranu netopýrů (ČESON) vznikla v roce 1991 za účelem zlepšení spolupráce mezi odborníky a amatéry zabývající se netopýry. Posláním této nevládní organizace je koordinace ochrany a výzkumu netopýrů. ČESON shromažďuje informace a poznatky o problémech, upozorňuje na ně odpovědné orgány a navrhuje jejich řešení. Dále vypracovává expertizy v oboru ochrany netopýrů a jejich prostředí a zajišťuje vzájemnou informovanost svých členů a příznivců společnosti o aktuálním stavu netopýří problematiky a v oboru výzkumu a ochrany netopýrů prosazuje vzájemnou spolupráci mezi amatéry, širokou veřejností, odborníky a státní správou. Výrazně se podílí na monitoringu netopýřích populací v ČR a reprezentuje státní ochranu netopýrů v tuzemsku i zahraničí.

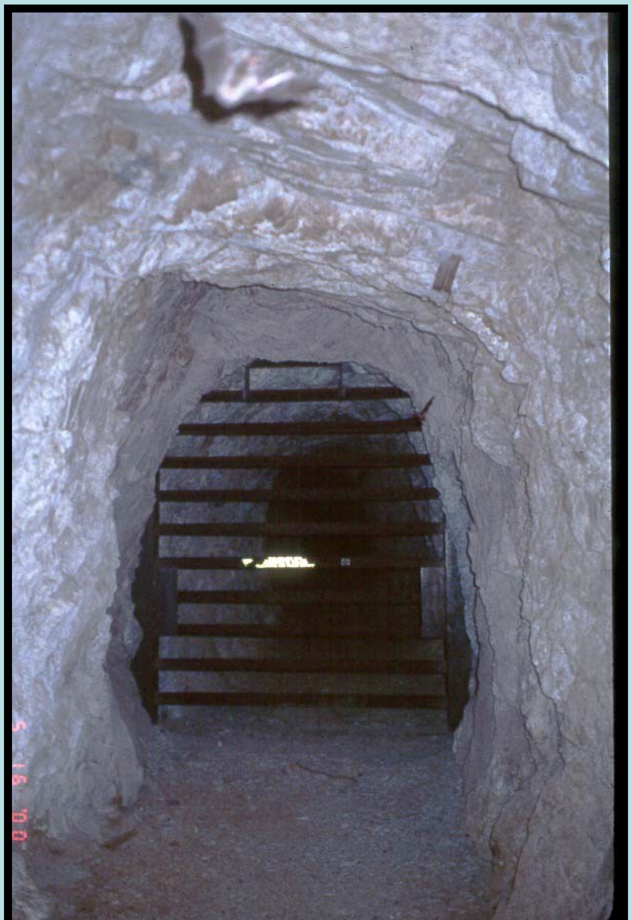
Aktuality

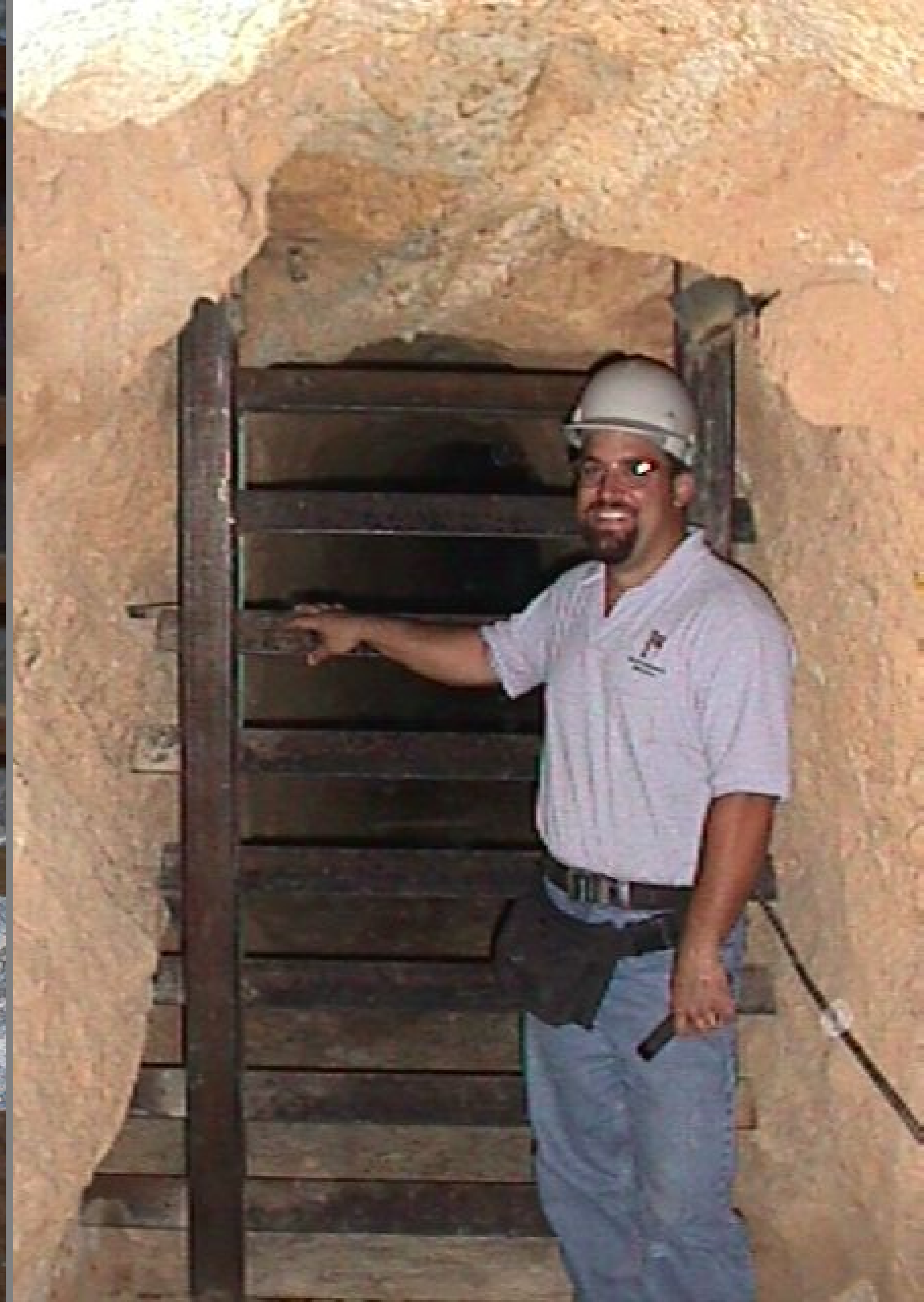
Výsledky fotosoutěže k Roku netopýra [11.1.2012]

Mezinárodní fotografická soutěž, kterou vloni vyhlásili pořadatelé kampaně Rok netopýra 2011-2012, již má své vítěze. Ve dvou tématických kategoriích se mezi oceněnými umístil náš člen - Přemysl Tájek (4. a 5. místo). Gratulujeme! Přehled vítězů a všech soutěžních fotografií si můžete prohlédnout zde.

Sunrise Relief Mine, Phoenix, Arizona

Gated Mines

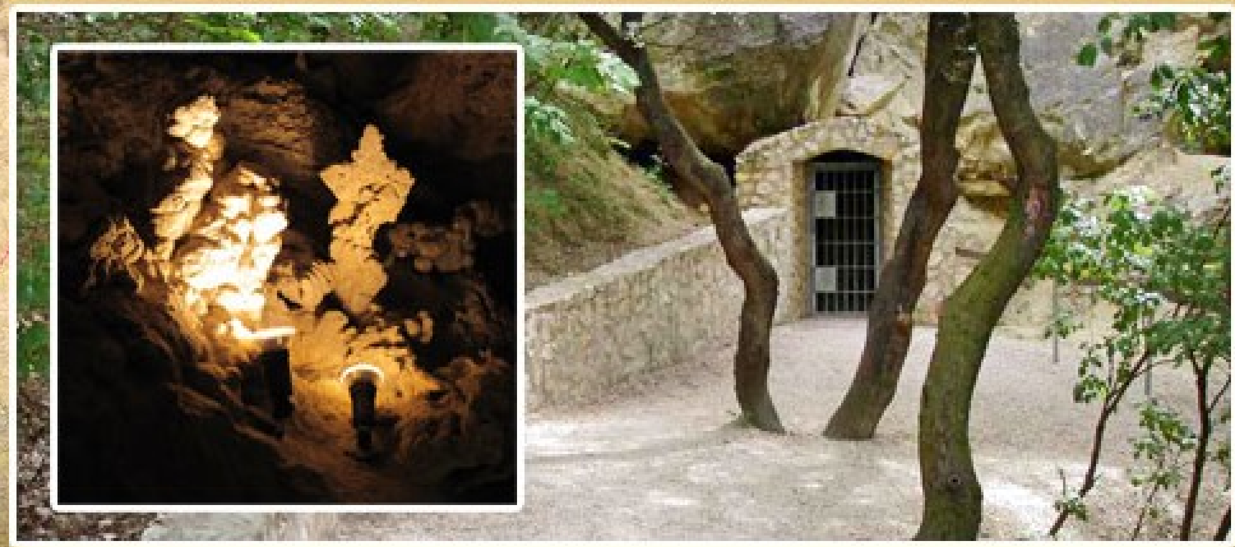


Bat Friendly

Not Bat Friendly

CUPOLAS



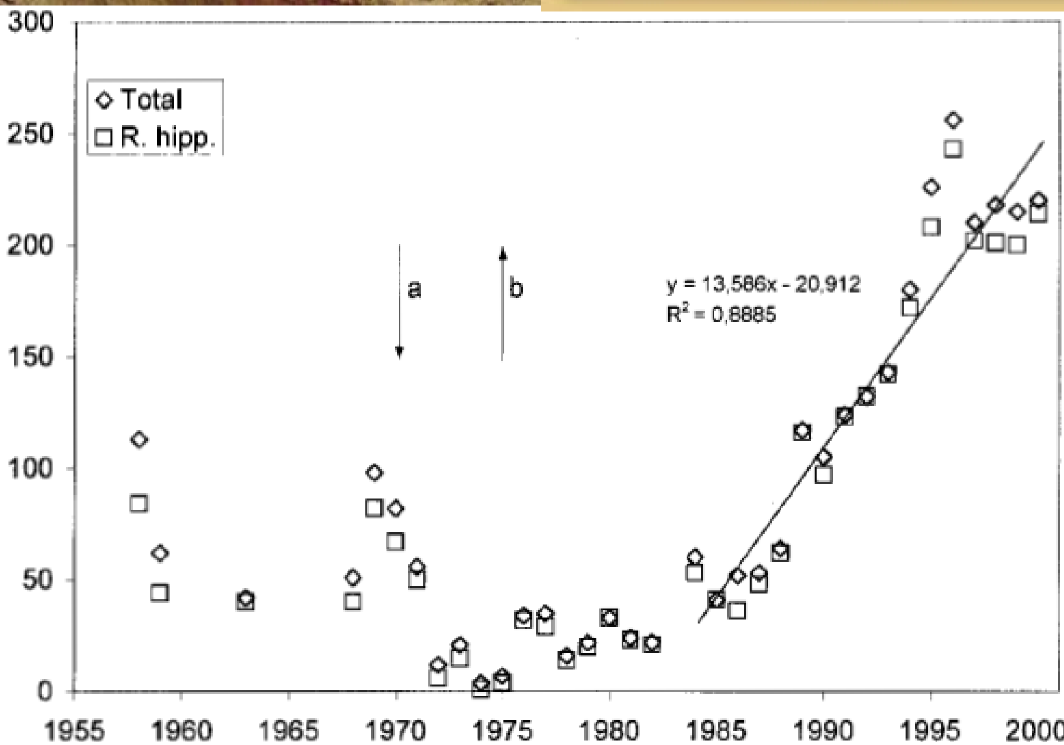
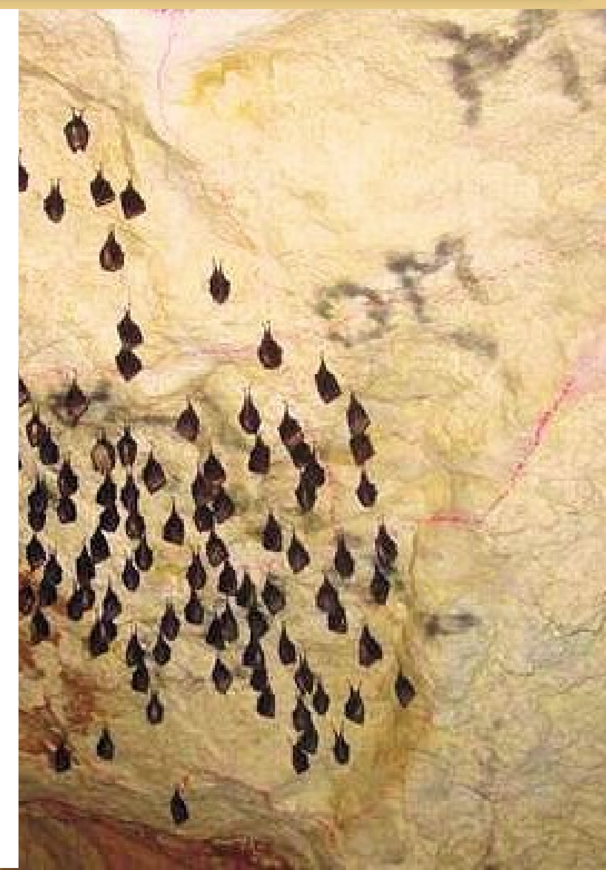
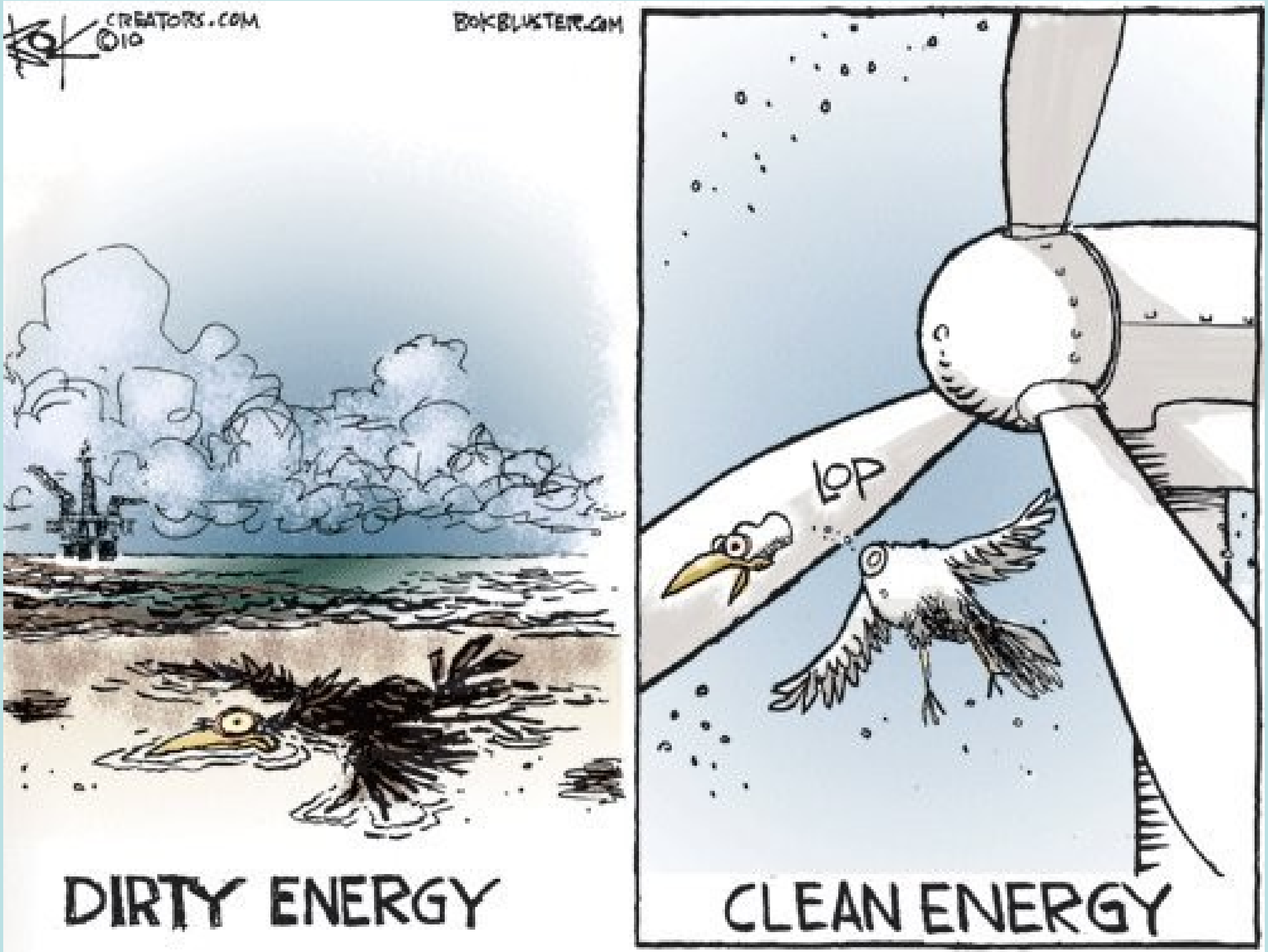


Fig. 1. Fluctuations in the numbers of hibernating bats recorded in the Na Turoldu Cave, 1958-2000 (y axis = number of bats, x axis = year). The arrow pointing downwards denotes the year the gate closing the cave was broken down, the arrow pointing upwards represents the year a new gate was installed, thus closing the cave once more.

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