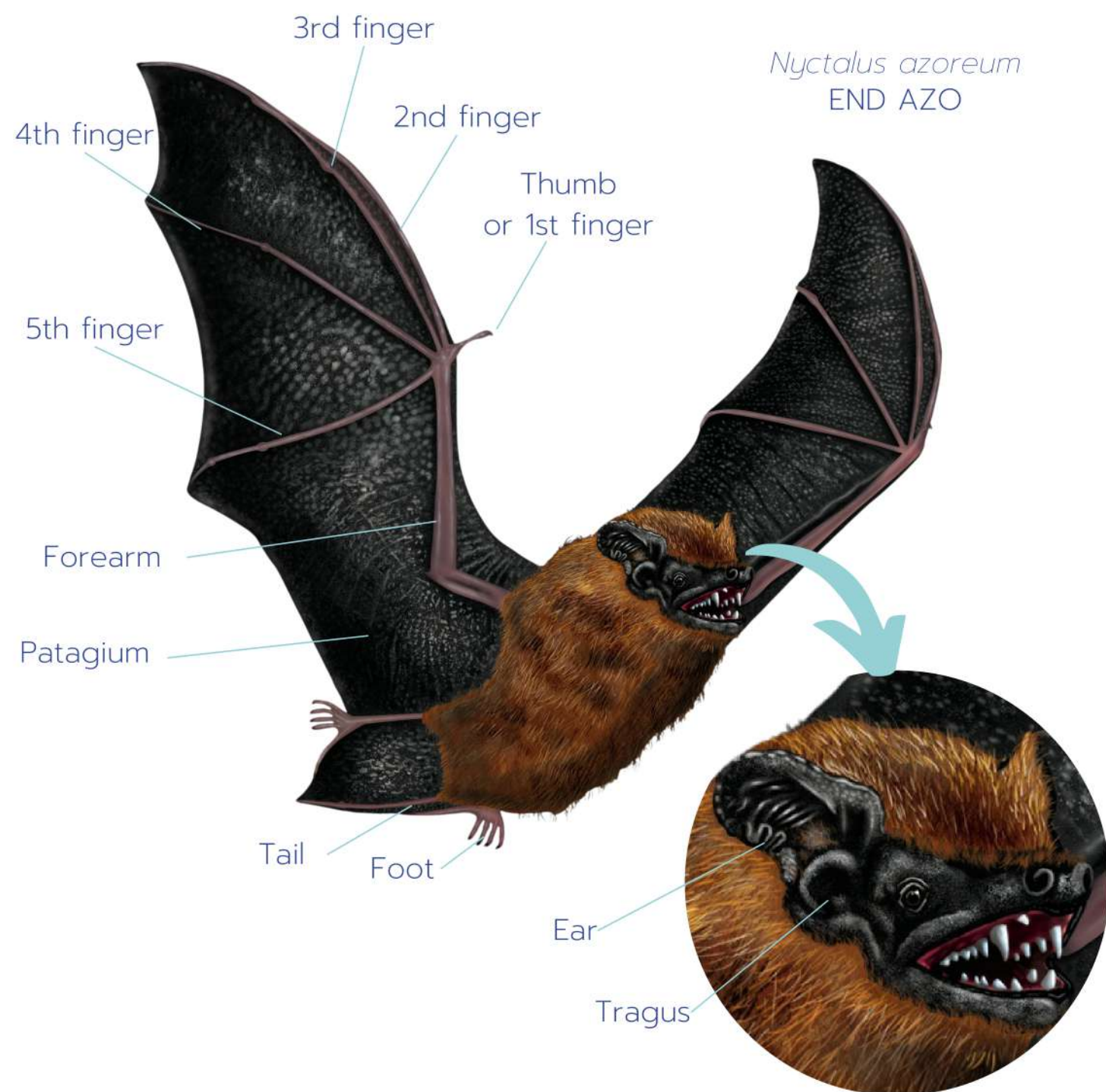


Bats of Macaronesia

Effects of light pollution on bats

Get to know the bats

- ✓ Bats are the only group of mammals capable of flight. They have modified forelimbs, with interdigital membranes that extend along the body, up to the legs, forming the wings.
- ✓ This group is highly diverse, with around 1,400 distinct species. They represent about a quarter of mammal species, which means that about 1 in every 4 mammal species is a bat.
- ✓ They have a great diversity of sizes, diets and behaviors, from the small Madeira pipistrelle (5g and 22cm wingspan) that feeds on insects, to some species of fruit bat (1kg and 2m wingspan), which they feed on pollen and fruits.
- ✓ They are essential species in the ecosystem, which provide very important services, such as pest control and pollination.



AROUND 25% OF ALL BAT SPECIES HAVE UNFAVORABLE CONSERVATION STATUS

Nyctalus leisleri
NAT

Plecotus austriacus
NAT

In the archipelagos of Madeira, Azores and Canary Islands there are nine species of insectivorous bats that play a fundamental role in the health of terrestrial ecosystems, through the control of pests and disease-transmitting insects.

Light pollution vs bats

- ✓ These nocturnal animals are among the groups most affected by light pollution, which influences ecological interactions and can have adverse effects on their feeding and reproduction behavior.
- ✓ Although some species can tolerate illuminated areas, and apparently benefit from the concentration of nocturnal insects attracted to light, gaining feeding opportunities, they end up being more exposed to the risk of collision and predation.
- ✓ Other species, which do not tolerate bright places, avoid bright areas, which, in turn, attract the insects they feed on, losing their prey in their natural habitat.
- ✓ On the other hand, when artificial light sources are placed near their dormitories, this "continuous day" can cause them to come out later to feed, missing the period of greatest insect activity and the opportunity to feed.

Bats of Macaronesia

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Main methodologies

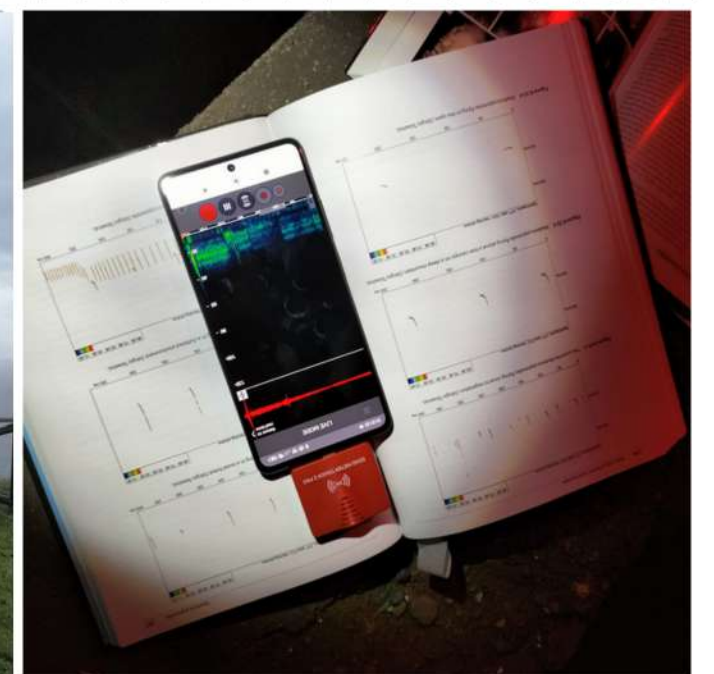
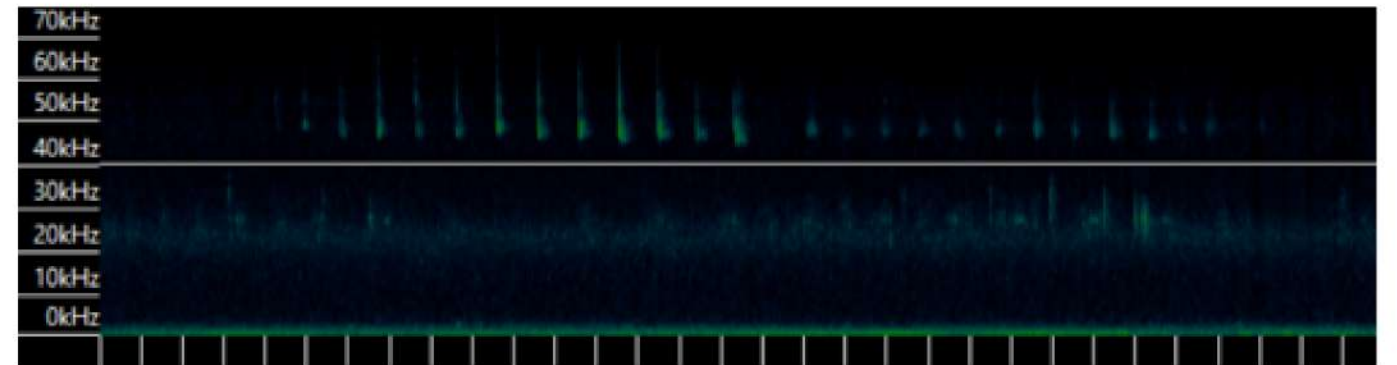
- ✓ Research and literature review on:
 - Bats in Macaronesia
 - Effects of light pollution on bats
 - Mitigation of the effects of artificial light on bats

Azores and Madeira island

- ✓ Sampling of bats in the Natura 2000 Network areas of the islands of Madeira and Graciosa:
 - Placement of recorders for acoustic detection
 - Bioacoustic analysis
 - Placing catch nets

Canary islands

- ✓ Analysis of georeferenced data collected by other studies



Results

- ✓ In Madeira, the Madeira pipistrelle (*Pipistrellus maderensis*) appears to be found in greater densities in the Laurissilva forest, and the Leisler's bat (*Nyctalus leisleri*) is more associated with open spaces. The Madeira pipistrelle is the most common, while the gray long-eared bat (*Plecotus austriacus*) has not been detected.

- ✓ In Graciosa, the Natura 2000 coastal areas have a low number of specimens. The Madeira Pipistrelle and the Azores noctule occur here, the latter being the most common and the only bat with daytime habits, although it also hunts at night.

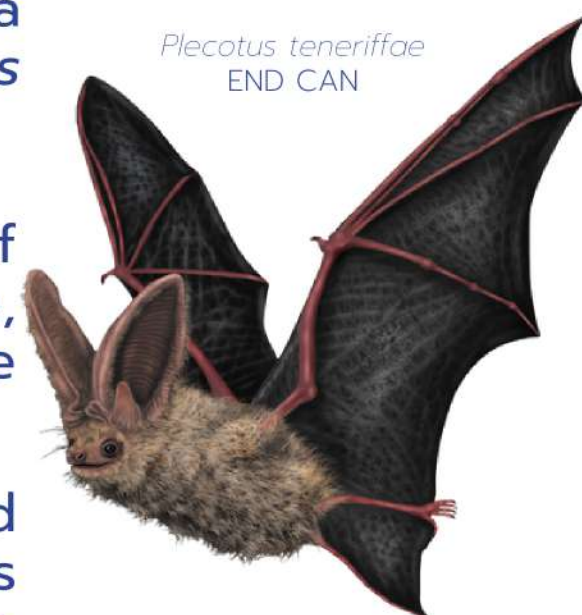
- ✓ The Canary Islands have eight species of bats. The European free-tailed bat (*Tadarida teniotis*), Kuhl's pipistrelle (*Pipistrellus kuhli*) and Savi's pipistrelle (*Hypsugo savii*) were detected in Gran Canaria. Madeira pipistrelle, free-tailed bat, Canary long-eared bat (*Plecotus teneriffae*), Kuhl's pipistrelle, Leisler's bat, western barbastelle (*Barbastella barbastellus*) and Savi's pipistrelle were detected in Tenerife.

- ✓ The Madeira pipistrelle is the only species common to the three archipelagos.

Pipistrellus maderensis
END MAC



Plecotus teneriffae
END CAN



There are several **knowledge gaps** in the biology of Macaronesian bats that could be essential for the development of conservation plans for the species.

Information about the best types of lights for bat conservation is uncertain. Currently, **lower intensity red lights** appear to be the best solution.

More studies are needed on the impacts and mitigation of light pollution on islands, especially in Macaronesia.

For the conservation of these oceanic populations, more studies and support from the population are needed for the conservation of Macaronesian bats.