

Bats keep separate households

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Separate homesteads: scientists from the MPI for Ornithology investigating the ecological niches of parti-coloured bats have discovered that males and females use entirely different foraging grounds. This means that from an ecological perspective, males and females behave like two different species. Credit: MPI for Ornithology

(PhysOrg.com) -- The use of different resources by males and females exacerbates the estimation of population sizes. However, the monitoring of population sizes, particularly for rare and threatened species, is pivotal to quick and effective conservation action. Scientists from the Max Planck Institute for Ornithology in Radolfzell investigated the ecological niches of male and female parti-coloured bats (*Vespertilio murinus*) and discovered that the sexes use entirely different foraging grounds. Their findings demonstrate that a finer grained view of what different demographic subsets of species do is essential for correct estimation of population trends with important implications on action plans for conservation.

Reliable knowledge of population sizes and changes thereof, which is often obtained by field surveys is essential for conservation. Differences in behaviour between demographic subsets of species, for example males and females, can lead to differences in resource use such as in diet or roost use. These differences can lead to specialisation and ultimately translate into spatial segregation within species. Reliable estimates of population sizes are however much hampered by sexual segregation. For threatened and rare species monitoring of [population trends](#) are essential for fast and appropriate conservation action.

Scientists from the Max Planck Institute for [Ornithology](#) in Radolfzell and their collaborators at the Swiss bat conservation centre now propose a novel way to obtain better estimates of [population size](#) for sexually segregating species.

They investigated the parti-coloured bat (*Vespertilio murinus*) in Switzerland. Although the distribution of this species stretches over a vast area reaching from the Netherlands all the way to China, the species is rare in Western Europe. Despite the fact that males and females are barely different in size and fur [coloration](#) and identical in their preferences for day roosts, at a close glance they are fundamentally different. As so often among mammals in the parti-coloured bats too, females carry the full load of parental care with no support whatsoever from males in raising their twin pups. Twinning is rather exceptional among bats and presumably leads to even higher energetic costs imposed on the females. These differences in the investment between the sexes, so the scientists argue, result in different tolerance of males and females towards the quality of their foraging areas and the amount of prey they need to sustain themselves, leading to a segregation of the sexes.



Reliable estimates of bat population sizes, which are essential for species conservation, are hampered by sexual segregation. Scientists are now proposing novel ways to obtain more accurate data by using radio telemetry data in conjunction with environmental data to create so-called "habitat suitability maps". Their findings suggest that it is not necessarily the typical habitat that should be regarded as the resource needing protection, but rather that of the more specialised demographic subset of the species pool. Credit: Max Planck Institute for Ornithology

Using radio telemetry data of male and female parti-coloured bats in conjunction with environmental data the scientists modelled the ecological niches of each of the sexes within the geographic area of Switzerland. This approach not only allowed to compare the amount of

suitable habitat available to each of the two sexes by generating so called habitat suitability maps, but also allowed to estimate and compare the degree and overlap in ecological specialisation between sexes. “Female parti-coloured bats seem to be highly specialised and rely heavily on lake shores for their foraging activities” says Mariëlle van Toor from the Max Planck Institute for Ornithology. “Male parti-coloured bats, albeit being also highly specialised, use other and a broader range of resources than females such as rivers, cities, and agricultural areas. The maps which showed no spatial overlap of foraging grounds between the sexes revealed therefore that suitable habitat is almost three times more abundant for males than females. From an ecological perspective males and females behave like two different species”, van Toor explains.

The study suggests that within the parti-coloured bat species, females are more vulnerable to habitat change and that conservation action has to pay special attention to their needs. More importantly, monitoring efforts should take these differences into account. This might represent a particular problem for bat surveys, since the most widely used method of acoustical survey which relies on counts of the echolocation calls emitted by the bats for orientation during flight does not allow to distinguish between males and females in the field. With the models presented in the study it will be possible to estimate the bias in sex specific habitat use where probabilities of sex specific habitat use can be associated with acoustic monitoring depending on the location in which the recordings were made.

Van Toor concludes: “This study shows that in species where sexes segregate not necessarily the typical or in other words the most common habitat should be regarded as vital resources that may need protection, but the habitat of the more specialised and thus more vulnerable demographic subsets of the entire species pool.” For the parti-coloured [bats](#) in Switzerland the availability of aquatic ecosystems such as lakes and marshes is essential for reproductive females to ensure that this

[species](#) finds enough prey also in the future.

More information: M.L. van Toor, et al. Integrating sex-specific habitat use for conservation using habitat suitability models. *Animal Conservation*, 24.03.2011, 1469-1795 [Doi: 10.1111/j.1469-1795.2011.00454.x](#)

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