

Why moths are attracted to light – increased barrier effects through street lighting

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Experimental field in Westhavelland northwest of Berlin, one of the darkest regions of Germany. Credit: Stefan Heller

Light at night changes animals' behaviour. A study conducted by the Leibniz-Institute of Freshwater Ecology and Inland Fisheries shows that moths are attracted to street lamps within a radius of approximately 23 metres. The number of specimens attracted depends on the position of the street lamp: on the border of dark zones, more moths are attracted to

the light than in an area's centre where many lamps are used. Considering the standard distance between lamp posts in Europe, the nightscape appears fragmented to moths. This causes them to lose valuable time and energy at the lamps, so that increasing lighting may decrease their abundance.

Moths are attracted to light – any child can tell you that. However, until now scientists did not know the range over which street lamps attract moths, whether illuminated streets act as a barrier to moth movement, or whether female or [male moths](#) are affected differently. This is an important ecological issue because the millions of street lamps in Europe influence the daily behaviour of billions of insects. Thus entire food webs and ecological processes are affected – unseen – during the night. Dr. Franz Hölker coordinates the "Loss of the Night" research platform at Berlin's Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB), which looks at the ecological, health and social impacts of [light pollution](#).

His working group set up a testing ground in Westhavelland. Seventy kilometres northwest of Berlin, in one of Germany's darkest regions is the country's first dark sky reserve. Here, there is hardly any light pollution: with a brightness of the sky of only 21.65 mag/arcsec², you can see the Milky Way and sometimes even the Northern Lights – something almost impossible to see anywhere else in Germany.



Aerial view of Berlin at night (Source: Copyright © 2012 WEW FU Berlin / IGB). Illuminated streets might divide a suitable moth habitat into many small patches with probably high dispersal costs between them.

In this place, where the night is still dark, Hölker and his colleagues installed street lamps and insect traps in a confined area. Over a period of two years, the researchers analysed the impacts of light at night on nocturnal insects. They were able to show that street lamps attract moths like a vacuum cleaner within a radius of approximately 23 metres. That's why more insects were found at the lamps at the edge of the area than at the lamps in the centre of the experimental field site," said Tobias Degen, lead author of the study.

The scientists, however, did not observe any difference in the attraction radius between male and female [moths](#), as originally expected. "In Europe, the distance between lamp posts is usually between 25 and 45

metres. In many cases we must assume that illuminated streets act as a barrier to moth movement," anticipated Franz Hölker. As a result, migratory species lose valuable time and energy to reach their destination and reproduce successfully. In order to protect moth populations at risk of extinction, the authors suggest that land-use managers should try to eliminate street lighting as much as possible in prime moth habitats, for example by turning off light at critical times in the year.

More information: Tobias Degen et al. Street lighting: sex-independent impacts on moth movement, *Journal of Animal Ecology* (2016). [DOI: 10.1111/1365-2656.12540](https://doi.org/10.1111/1365-2656.12540)

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