Night lights affect songbirds' mating life

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Too much light: Artificial lighting at night leads to the males of certain species of songbirds starting to sing earlier in the morning. At the same time, female blue tits start to build nests earlier while male blue tits allow themselves a bit on the side. Image: Jan Kempenaers

In today's increasingly urbanized world, the lights in many places are always on, and according to a report published online on September 16 in of *Current Biology*, a Cell Press publication, that's having a real impact on the mating life of forest-breeding songbirds.

"In comparison to chemical and noise pollution, light pollution is more subtle, and its effects have perhaps not received the attention they deserve," said Bart Kempenaers of the Max Planck Institute for Ornithology in Germany. "Our findings show clearly that light pollution influences the timing of breeding behavior, with unknown consequences

for bird populations."

The researchers investigated the effects of artificial night lighting on dawn song in five common forest-breeding songbirds. In four of those five species, males near street lights started singing significantly earlier in the morning than did males in other parts of the forest.

Further study of the effects of that behavioral shift on blue tits based on comparison of their reproductive behavior with and without street lights over a 7-year period showed real consequences. Females near street lights laid their eggs on average a day and half earlier. And males near lights at the forest's edges were more successful in attracting "extra-pair mates," meaning that they more often sired offspring with females other than their primary social partners.

That might sound like a bonus for those males, but Kempenaers said that doesn't mean it's good for the species, and it might not even be good for the males in question.

"Earlier singing during the morning may come at a cost to males," he said, noting that they may get less sleep and may be at higher risk of predation. "Second, females are thought to engage in extra-pair copulations with high-quality sires to increase the quality of their offspring. These females may use early singing as a cue reflecting male quality. Light pollution may disrupt the link between the cue—early singing—and male quality, so that females would end up having their offspring sired by lower-quality males. These costs—if they exist—will be hard to measure."

Kempenaers said that earlier studies had shown that artificial night lighting can influence birds that migrate at night. For instance, many birds are killed when they fly into lighted towers. But other effects of light pollution on animals hadn't been well documented.

"I suspect that the effects on breeding will be very general, and not restricted to birds," he said. "The effect on extra-pair paternity may be more unique to blue tits or to those species where females use the dawn song as a cue. We know too little about this in other birds."

Kempenaers speculates that the effects of night lighting on breeding times may grow stronger as birds and other animals respond to warming spring temperatures as well. But, he says, the consequences of such a shift for the birds will ultimately depend on whether or not it creates a mismatch between breeding and the peak availability of food.

There may be some hope for a solution. Kempenaers says there are companies working to develop lamps with a reduced ecological impact, and researchers in the Netherlands and Germany are starting to test the effects of those alternatives.

More information: Bart Kempenaers, Pernilla Borgström, Peter Loës, Emmi Schlicht and Mihai Valcu, Artificial night lighting affects dawn song, extra-pair siring success and lay date in songbirds, *Current Biology*, published online September 16, 2010

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