

Outdoor lighting may affect tiger beetle

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[Kristine Nemeč for the Lincoln Journal Star](#) JournalStar.com | Posted: Friday, November 18, 2005 6:00 pm | [No Comments Posted](#)

Everyone knows porch lights on summer nights attract swarms of insects. What they don't know is that the swarm might include some pretty unusual bugs.

Bill Allgeier wonders if outdoor lights attract the rare Salt Creek tiger beetle.

Steve Spomer, research technologist with the University of Nebraska-Lincoln, said the beetle faces extinction for several reasons. It lives only along stream banks in the Little Salt Creek watershed and in adjacent saline wetlands, one of Nebraska's most imperiled ecosystems.

Biologists have long known urbanization affects wetland species. Buildings and paved surfaces alter drainage patterns, carrying excess water and contaminated runoff from lawns and roads to local wetlands. But Allgeier is one of only a few scientists in the country to study how urban lights may affect tiger beetles.

Allgeier is no stranger to big city lights. He grew up near Detroit and was an auto industry executive for six years before starting graduate school in Lincoln. With Spomer and UNL entomology professor Leon Higley, Allgeier has studied how Salt Creek tiger beetles respond to different kinds of urban light in a two-year study funded by the Nebraska Game and Parks Commission and the U.S. Fish and Wildlife Service.

Allgeier brainstormed with Higley, entomologist Wyatt Hoback of the University of Nebraska at Kearney and other graduate students to devise a "choice chamber" to determine what lights most attract the beetle.

The chamber, painted black and designed so no stray light could enter, consists of six spokes of equal-length plastic pipe radiating from a center bucket. Each spoke connects to a bucket that holds a different kind of light. The lights are adjusted to the same intensity with an ultraviolet and quantum light meter and a radiometer.

Five common urban lights were used in the study: mercury vapor, sodium vapor, fluorescent, incandescent and blacklight. One bucket was left dark as a control.

Mercury vapor and sodium vapor lights are used in street lamps; fluorescent and incandescent lights are used in commercial, industrial and residential lighting; and blacklight is used in insect light traps, or bug zappers. Gas stations and car dealerships mainly use metal halide, which was not tested. Allgeier said metal halide emits wavelengths similar to mercury vapor lights.

For each choice test, a single beetle was placed in the middle of a circular platform about four inches below the lid of the center bucket. It then ran toward its preferred light (or dark) at the end of a tunnel. Allgeier recorded what choice the beetle made, then placed a new one in the chamber.

Twenty-one to 31 beetles were used in each experiment in both years of the study, then released back into the wild.

The researchers found significantly higher numbers of beetles were attracted to the high UV-emitting mercury vapor and blacklight lamps than to the others. They recommended developers use sodium vapor and incandescent lighting near Salt Creek tiger beetle habitats.

Larry Kathol, senior field engineer for Lincoln Electric System, said street lamps near the saline wetlands contain high-pressure sodium vapor lights.

“Mercury vapor lights are an old technology that are being phased out because they are so inefficient,” he said. “We only use them in some security lighting.”

But Allgeier is concerned about the intensity of light in the beetle’s environment. In the choice chamber, beetles significantly preferred sodium vapor and mercury vapor lights over darkness at the lowest measurable light intensity, about as bright as a candle in a small room. Intensity levels near some Salt Creek tiger beetle populations are higher than this low level, he said.

If individual beetles leave their natural habitat for outdoor lights at night, the population could drop. Allgeier has seen females lay eggs only at night.

“If the females are spending their time at lights, they are not creating the next generation,” he said.

Males are also busy at night, finding females and guarding them from other males. Both sexes may be more likely to die if they are drawn into the path of traffic or to lights patrolled by insect predators like bats.

It’s hard to say how far a Salt Creek tiger beetle will travel to get to a light, but Allgeier has recorded them going a quarter mile between patches of habitat. Based on this data and field observations, he recommends a half-mile buffer zone around tiger beetle populations to protect them from outdoor lights.

In 2001, a committee of landowners, scientists, developers and city staff created to discuss how to protect the tiger beetle recommended a range of buffer zones from 100 feet to a quarter mile.

Then-Mayor Don Wesely picked a 500-foot buffer zone as a compromise, said city planner Mike Dekalb. The buffer zone applies to projects outside of city limits.

Dekalb said if the U.S. Fish and Wildlife Service recommends a specific buffer zone, the city will reexamine the issue.

Kristine Nemeč is an ecologist with the U.S. Army Corps of Engineers in Omaha. She wrote this story for a science-writing class at the University of Nebraska-Lincoln College of Journalism and Mass Communications.

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