Tufts researchers say fireflies are in danger on three fronts

By **Martin Finucane** Globe Staff, Updated February 3, 2020, 4:40 p.m.

Fireflies like this female glow-worm (Lampyris noctiluca) from England are under stress. (Jason Steel) JASON STEEL

Fireflies, those flickering beacons of mystical summer nights, are in danger, according to a team of biologists led by researchers from Tufts University.

The team surveyed experts from around the world and found that the insects are under pressure from habitat loss; artificial light, which can confuse them during mating; and pesticide use.

There are more than 2,000 firefly species across the globe. They are “iconic insects whose conspicuous bioluminescent courtship displays carry unique cultural significance, giving them economic value as ecotourist attractions,” the team said in a perspective piece published in the journal Bioscience.

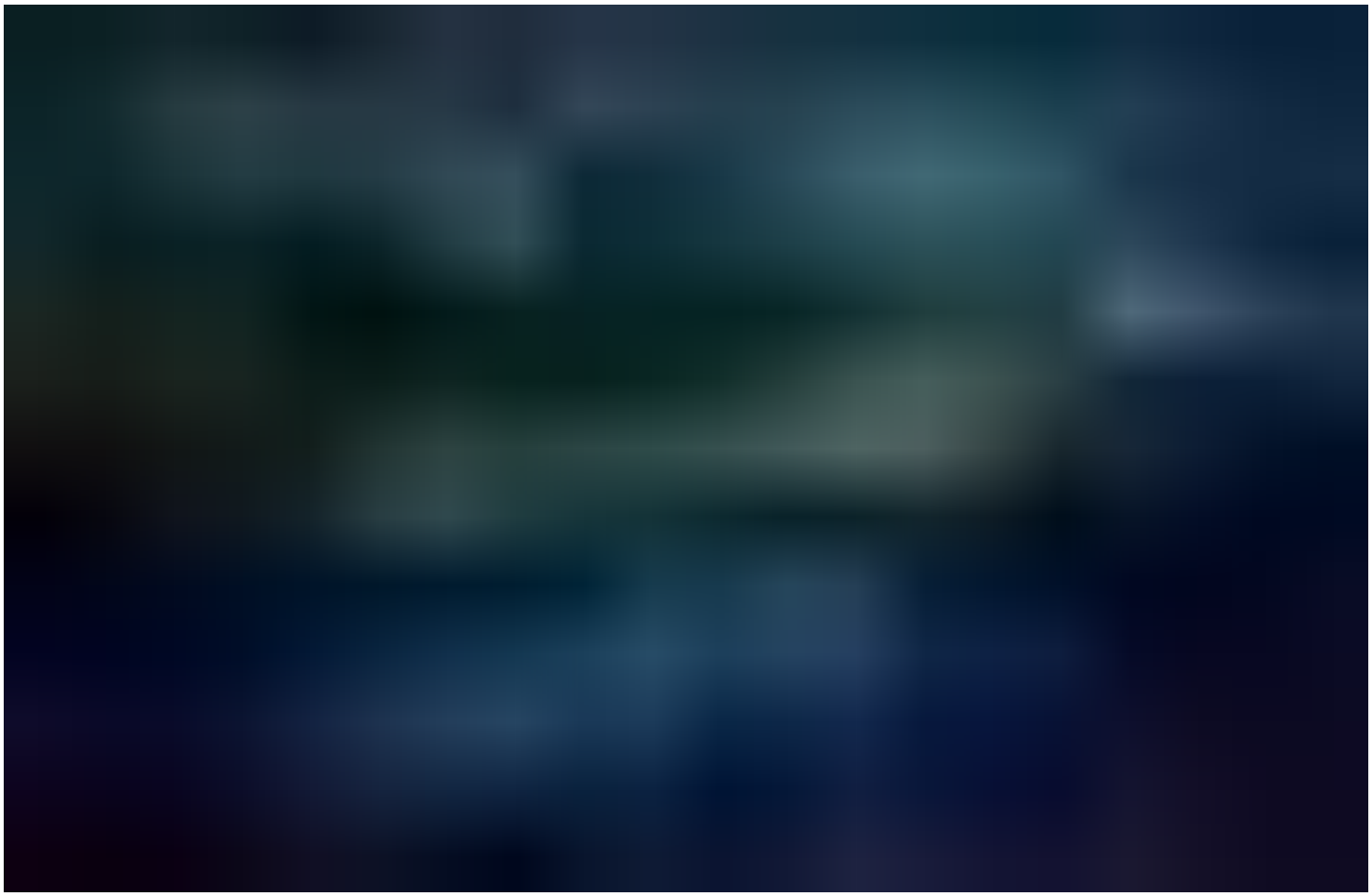
“However, as is true for many invertebrates, fireflies have been largely neglected in global conservation efforts,” the article said.

The article, which also surveyed existing research on the status of fireflies, reported that “habitat loss was perceived as the most serious threat to fireflies globally.”

Tufts biology professor Sara Lewis, who led the team, said in a statement from the university that “it wasn’t a huge surprise that habitat loss was considered the biggest threat," since such loss is affecting many species.

Lewis said some fireflies are especially vulnerable because they need unique conditions to complete their life cycle. She noted that one Malaysian firefly, Pteroptyx tener, is a "mangrove specialist.” But research has found that the species is drastically declining after conversion of its mangrove habitat to palm oil plantations and aquaculture farms.

In Europe, the article said, “firefly habitat has been lost through urbanization, industrialization, and agricultural intensification.”



Fireflies in the Smoky Mountains RADIM SCHREIBER/FIREFLYEXPERIENCE.ORG/RADIM SCHREIBER

Light pollution from human settlement also "really messes up firefly mating rituals," Avalon Owens, a doctoral candidate in biology at Tufts and a co-author, said in the statement

Many fireflies rely on bioluminescence to find and lure mates, and research has shown that too much artificial light can disrupt the dance. Switching to energy-efficient, bright LEDs is not helping. "Brighter isn't necessarily better," said Owens.

Insecticides such as organophosphates and neonicotinoids also have unintended effects on beneficial insects, the article said.

The poll of firefly experts, said University of Florida entomologist Marc Branham, who

was not a member of the research team, was the “next best thing” to traveling back in time to count firefly populations. He’s been told many anecdotes of missing fireflies. And often, he said, they’re believable. Fields once full of flashing insects “are so obvious, in a sort of a sad sense,” when the light vanishes, he said.

"One of the things we've kind of taken for granted is that fireflies will always be here," said naturalist Ben Pfeiffer, founder of the nonprofit Firefly Conservation & Research organization and one of the firefly experts who was surveyed. "And we've been terribly wrong about that."

The article also identified several other potential threats, including firefly tourism, which draws hundreds of thousands of people in Asia, the United States, and Mexico.

The authors made several recommendations, including preserving habitat, reducing pesticide use, and controlling light pollution. A watchful eye should also be kept on firefly tourism, the article said.

“Firefly tourism is proliferating worldwide and would benefit from recommendations about best practices for establishing and managing tourist sites. Such guidelines would outline ways to protect both larval habitat and adult display sites from disturbances that include trampling, light pollution, and pesticides,” the authors recommended.

The authors called for more research on the status of fireflies.

Material from Globe news services was used in this report.