

Night Lights

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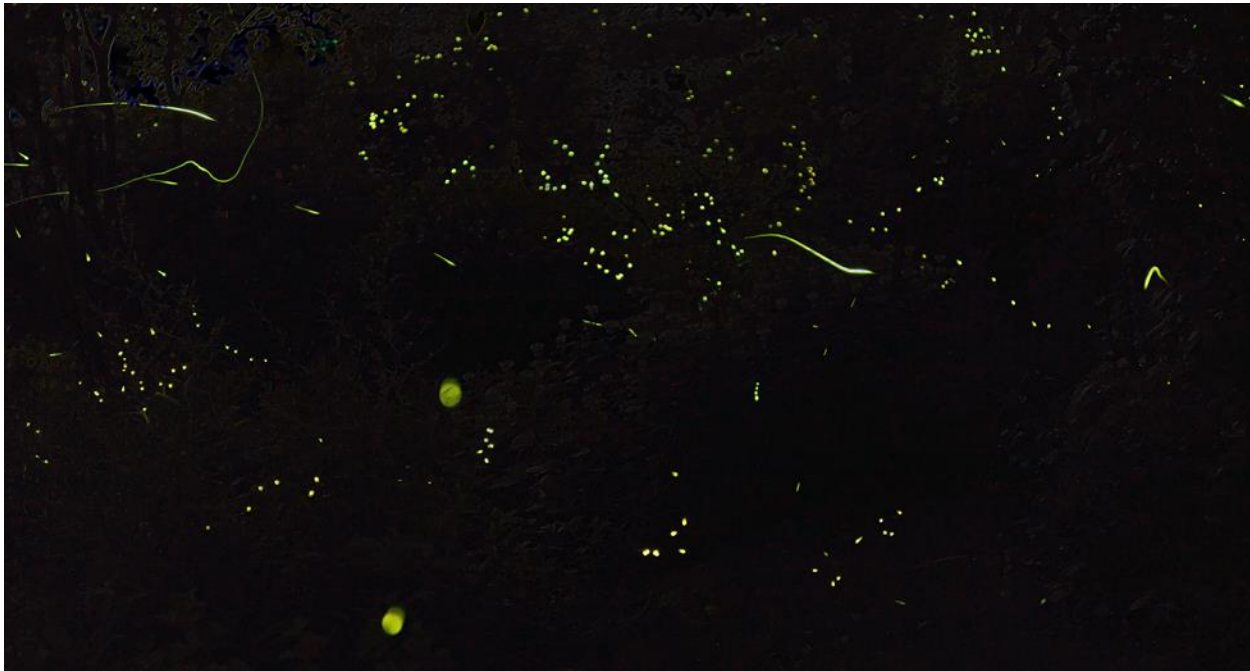
At first glance, this image looks like an underexposed photograph taken on an overcast day and marred by blemishes and scratches. In reality, this picture is of the darkest corner of a Fairfax yard at 10:30 p.m. The “marring” is firefly signals! This digital composite* visually approximates the problem that fireflies have with light pollution. A streetlight blazes in the top left corner, neighbors’ lights illuminate the foreground, local urban areas add a glow, and moon and stars contribute a small portion of light. Around the world, scientists notice decreases in firefly populations—more than what can be attributed to pesticide applications (including treatments against adult mosquitoes and ground-dwelling grubs, both known to harm fireflies), climate change, or habitat loss. In regions brightly lit at night, male fireflies emit their mating signals as usual, but the females apparently are unable to see the male flashes and fail to reply with a responding twinkle. The firefly species that signal only at night are more prone to light pollution impacts than those emerging at sunset. This type of urban detriment on wildlife is akin to songbirds chirping louder or at higher pitches in cities than their rural counterparts to be heard above city noise pollution.

Many people love watching firefly displays, which begin in late May, peak in June, and continue throughout the summer with occasional stragglers into autumn. These beneficial beetles (calling them “lightning bugs” is a misnomer) are voracious predators in their larval stage, targeting soil invertebrates. In turn, mites and certain fly maggots prey on the developing fireflies, thereby keeping the beetle population in check. Fireflies may spend one to two years in the larval stage and several weeks at each of their other life stages: egg, pupa, and adult. Depending on the species, firefly adults may consume pollen and nectar, thereby benefitting from pollinator gardens. Other fireflies forego any eating while fireflies in the genus *Photuris* lure and devour males from different firefly species! With few exceptions such as that last example, adult fireflies glow without too much concern of becoming dinner themselves because they produce foul-tasting defense chemicals.

Now we know a bit about fireflies and how light pollution affects these charismatic critters. Furthermore, underrated light pollution harms many other organisms including humans. The quality of light is as important as the brilliance, such as the blue casts from LEDs that disrupts people’s sleep more than warm-toned bulbs. Steps to reduce light pollution are as easy as turning off a light switch. When folks work in the yard after nightfall, expect guests, or dine on the patio, brightening the scene with a porch light is per-

fectly fine. When nobody is outside, turn off those outdoor lights including decorative ones. Not to worry, Christmas lights are all right with reduced wildlife vulnerability in late December. Interior light escapes from open windows, so drawing curtains and closing blinds help. When shopping for new outdoor lighting, select energy-efficient models that point light downward instead of to the sides or up. Security lights, together with cameras, are best activated by motion sensors; team them with motion-triggered sprinklers meant to discourage garden-foraging deer and give a prowler another nice surprise, too!

The final frame is made from the same photographs after removing all ambient light, thereby illustrating how much easier fireflies can signal and see one another in a dark environment.



***Image details: the first picture is a stack of three, 15-second exposures, each taken at f2.8, 70 mm lens, ISO 1EV over 6400. One photograph is the main image and the other two are screened on top to only show the differences (firefly signals). The second image uses the same photographs except the digital filters are set to only show the difference between the separate shots.**

Supporting Literature and Reports:

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Additional Websites and Videos:

- Fireflies and Lightbulbs: Does Manmade Light Impact Ecosystems? <http://www.illinoislighting.org/fireflies.html>
- Earth Eclipse—Serious Effects of Light Pollution <https://www.earthclipse.com/pollution/serious-effects-of-light-pollution.html>
- Firefly: <https://www.firefly.org/>
- Our *Vanishing Night* video: https://www.youtube.com/watch?time_continue=2&v=JJ9aLiy9ucQ
- TED Talk: *Light Pollution* by John Garrett: <https://www.youtube.com/watch?v=jlZYTfUrhCY>

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