

PHOTORIA:

Exploring the value of Fireflies through immersive Narrative





Fireflies: International recognition



©2009, Dianna Walla
<http://paper-tiger.net/>
<https://www.flickr.com/photos/adelig/>



Selangor Declaration, 2010

- ▶ Fireflies are a part of our biodiversity heritage and **are iconic insects** that have been the subject of much investigation in the sciences, **an inspiration in the arts and a part of local cultures**, folklores and traditions because of their ability to produce light.
- ▶ Fireflies **have been a source of ecotourism revenue** for many communities in different parts of the world and have the potential to bring similar benefits to other local communities. Fireflies and their natural habitats **also enhance quality of life and contribute to economies** through the promotion of aesthetically pleasing landscapes that have greater appeal.
- ▶ Fireflies **are bio-indicators of the health of the environment and are declining across the world** as a result of degradation and loss of suitable habitat, pollution of river and water systems, increased use of pesticides in agro-ecosystems, non-regulated commercial harvesting and increased ecological light pollution in areas of human habitation.



Fireflies: International recognition, limited distribution

Map of Observations



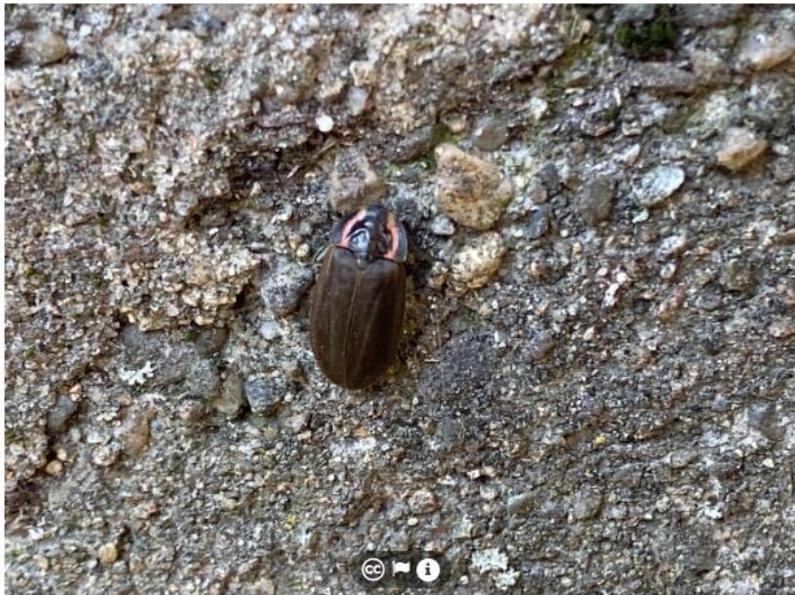
<https://www.inaturalist.org/projects/fireflyers-international>



Fireflies: International recognition, limited distribution

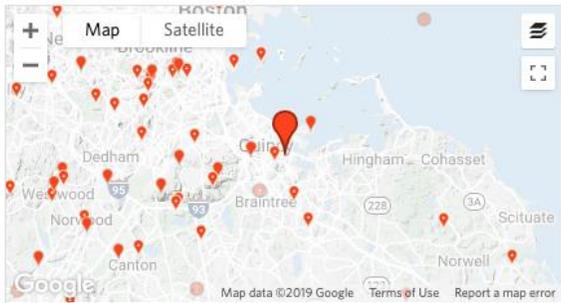
iNaturalist Explore Community **More** Log In or Sign Up

Winter Firefly (*Ellychnia corrusca*) Research Grade



phudao001 42 observations

Observed: Sep 22, 2019 · 10:30 AM EDT Submitted: Oct 9, 2019 · 12:34 AM EDT



Fifth Ave, Quincy, MA, US Details

Activity

phudao001 suggested an ID Improving 14d

Winter Firefly
Ellychnia corrusca

Community Taxon What's this?

Winter Firefly (*Ellychnia corrusca*)
Cumulative IDs: 3 of 3

0 2/3rds 3



Fireflies: International recognition, limited distribution

Map of Observations



<https://www.inaturalist.org/projects/fireflyers-international>



Firefly Watches: Mass Audubon, Boston Museum of Science, Tufts University

The screenshot shows the Mass Audubon website's navigation bar with 'Get Involved' highlighted. The breadcrumb trail is 'Home > Get Involved > Citizen Science > Firefly Watch'. A left sidebar lists various engagement options, with 'Citizen Science' expanded to show 'Firefly Watch' and its sub-links. The main content area features a large image of fireflies at night, followed by a title 'Firefly Watch Citizen Science Project', a descriptive paragraph, a 'Why Watch Fireflies?' section, and a 'FOR PROJECT PARTICIPANTS' box with links for submitting observations and viewing FAQs.

Mass Audubon Get Outdoors **Get Involved** Learn Conservation News & Events About 🔍 JOIN DONATE

Home > Get Involved > Citizen Science > Firefly Watch

GET INVOLVED

- Membership
- Ways to Give
- Volunteer
- Take Action
- Conserve Land
- Citizen Science**
 - Firefly Watch**
 - How to Participate
 - Submit Observations
 - View & Explore Data
 - Project FAQ
 - About the Researchers
 - Programs & Events
 - About Fireflies
 - Resources
 - Avian Collision Team (ACT)

Firefly Watch Citizen Science Project



Firefly Watch combines an annual summer evening ritual with scientific research. Join a network of citizen scientists around the country by observing your own backyard, and help scientists map fireflies.

Why Watch Fireflies?

Are firefly populations growing or shrinking, and what could lead to changes in their populations? Mass Audubon has teamed up with [researchers from Tufts University](#) to track the fate of these amazing insects.

FOR PROJECT PARTICIPANTS

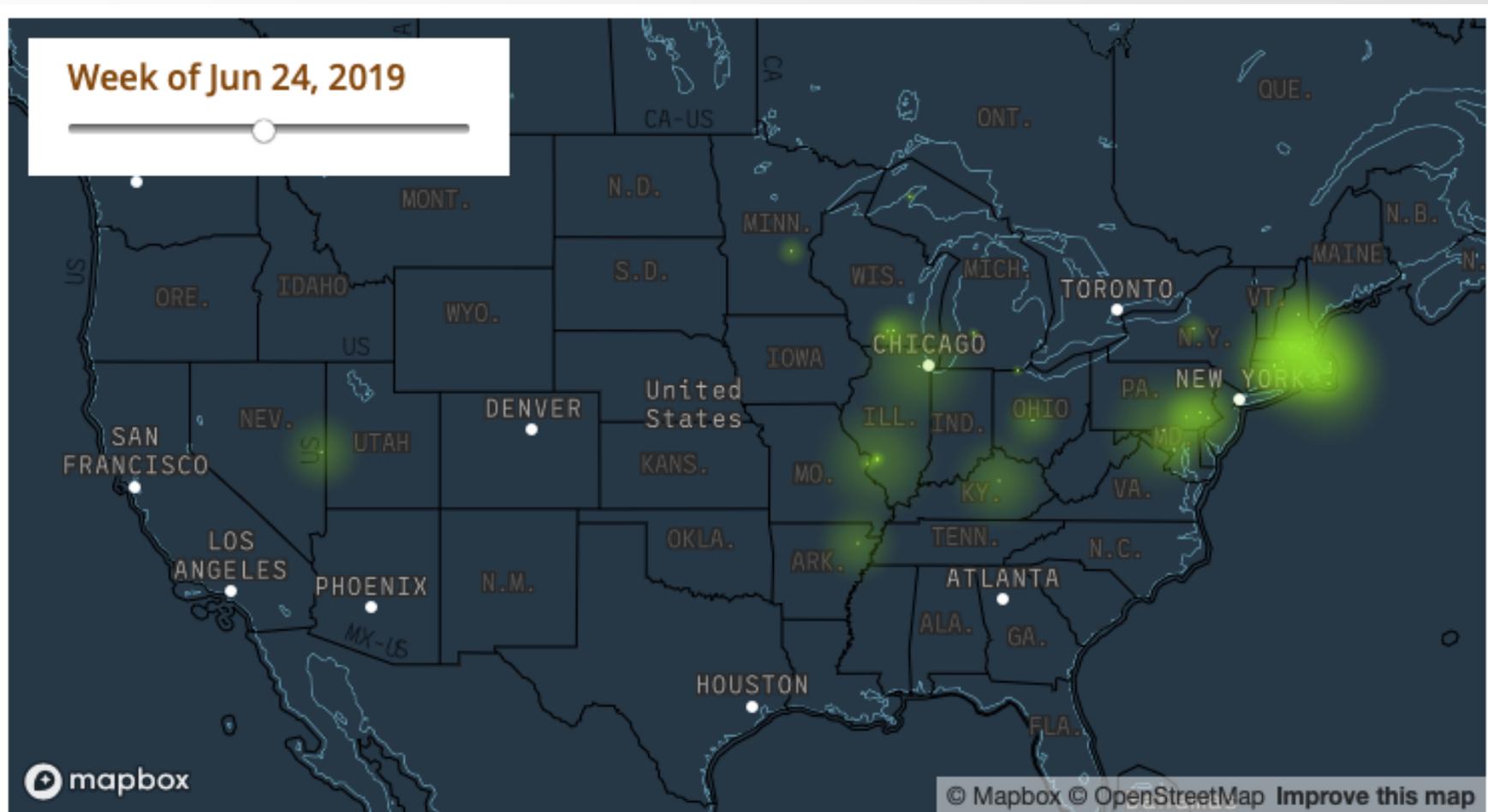
- To Submit Observations
- [Log in to your account >](#)
- Project FAQ

Questions about the project? Explore our answers to some of the [most commonly asked questions](#).

<https://www.massaudubon.org/get-involved/citizen-science/firefly-watch/>



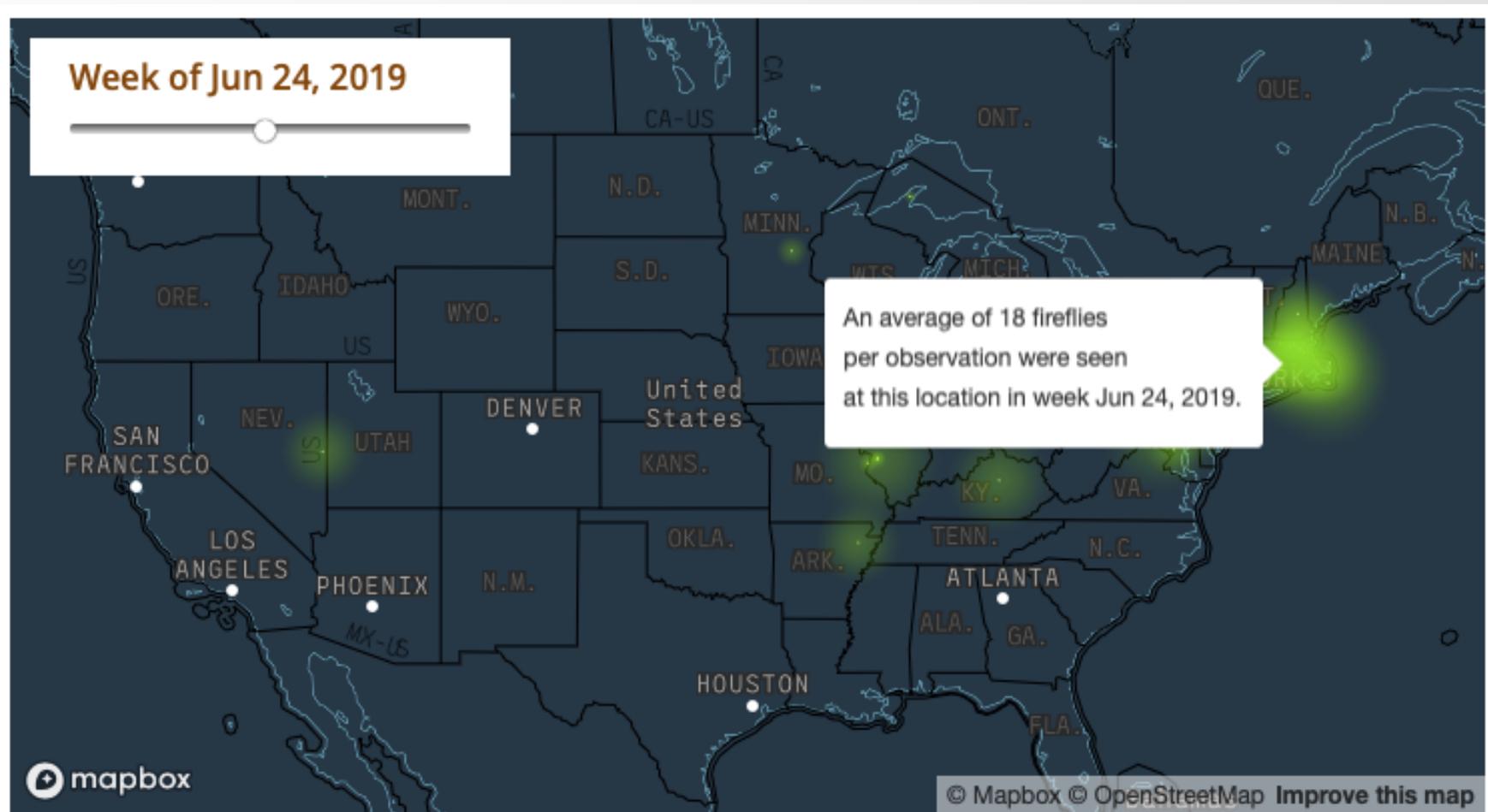
Firefly Watches: Mass Audubon, Boston Museum of Science, Tufts University



"Visualization of firefly reports in 2019" created by Matthew Smith and [Mapbox volunteers](#) Lo Benichou and Sam Fader.



Firefly Watches: Mass Audubon, Boston Museum of Science, Tufts University



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Firefly Watches: Mass Audubon, Boston Museum of Science, Tufts University



©2018, Yuki Karo



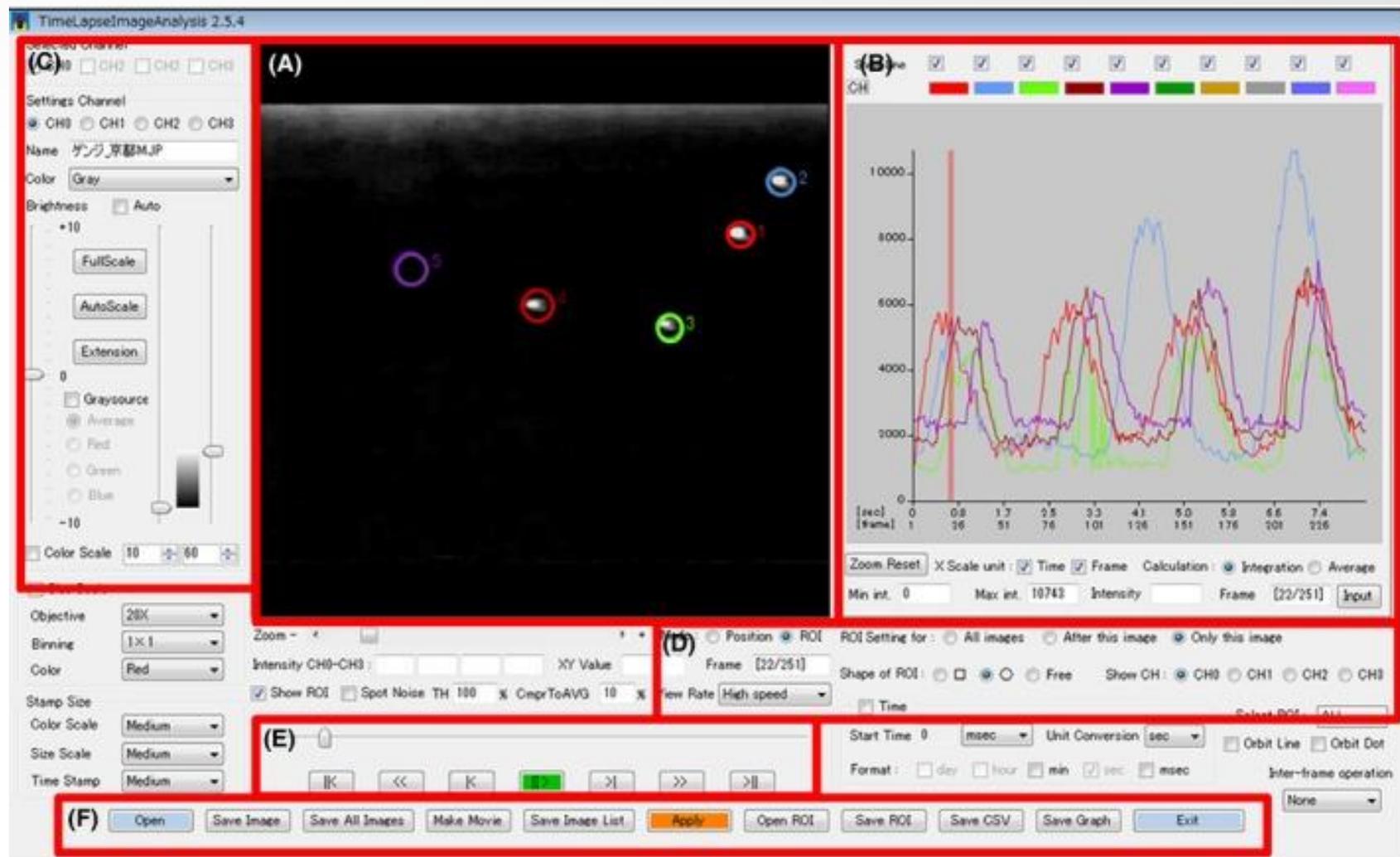
Immersive Fireflies

Yellow green flash - *Photinus* sp.

		1 sec. 2 3 4 5 6 7 8								
Variable flash	<i>consimilis</i> male (fast pulse)	■	■	■	■	□	□	□	□	(repeated 10.6 seconds at 66□□)
	<i>consimilis</i> female									(female flash 3 sec. after last flash of male) ■ □ □ □ (70°)
	<i>consimilis</i> male (slow pulse)	■		■				□		(repeated at 14.7 seconds at 67□)
	<i>consimilis</i> female	?								
	<i>carolinus</i> male	■	■	■	■	■	■	□	□	(repeated at 10 seconds at 70□)
	<i>carolinus</i> female									(female flash 3 sec. after last flash of male) ■ ■ □ □ □ (70□°)
<i>carolinus</i> male	■	■	■	■	□	□	□	□	(repeated at 13.8 seconds at 64□)	
<i>carolinus</i> female									(female flash 6.4 sec. after last flash of male and may be repeated 2-3 times) ■ ■ (67°)	
<i>obscurellus</i> male	■	■	□							
<i>obscurellus</i> female									(female flash 3 seconds after last flash of male) ■ ■ ■ ■ □ □ □ (65°)	
<i>ardens</i> male	■		■				□		(repeated 10 to 20 seconds at 67□□)	
<i>ardens</i> female									(67□°) □	

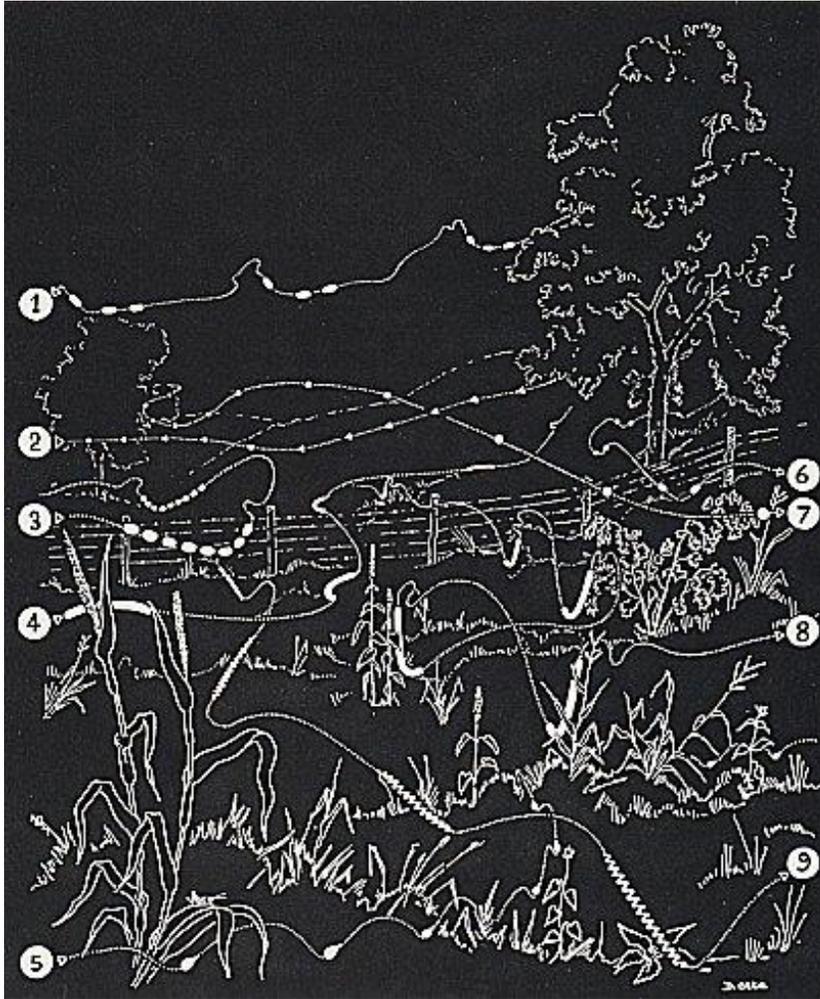


Immersive Fireflies

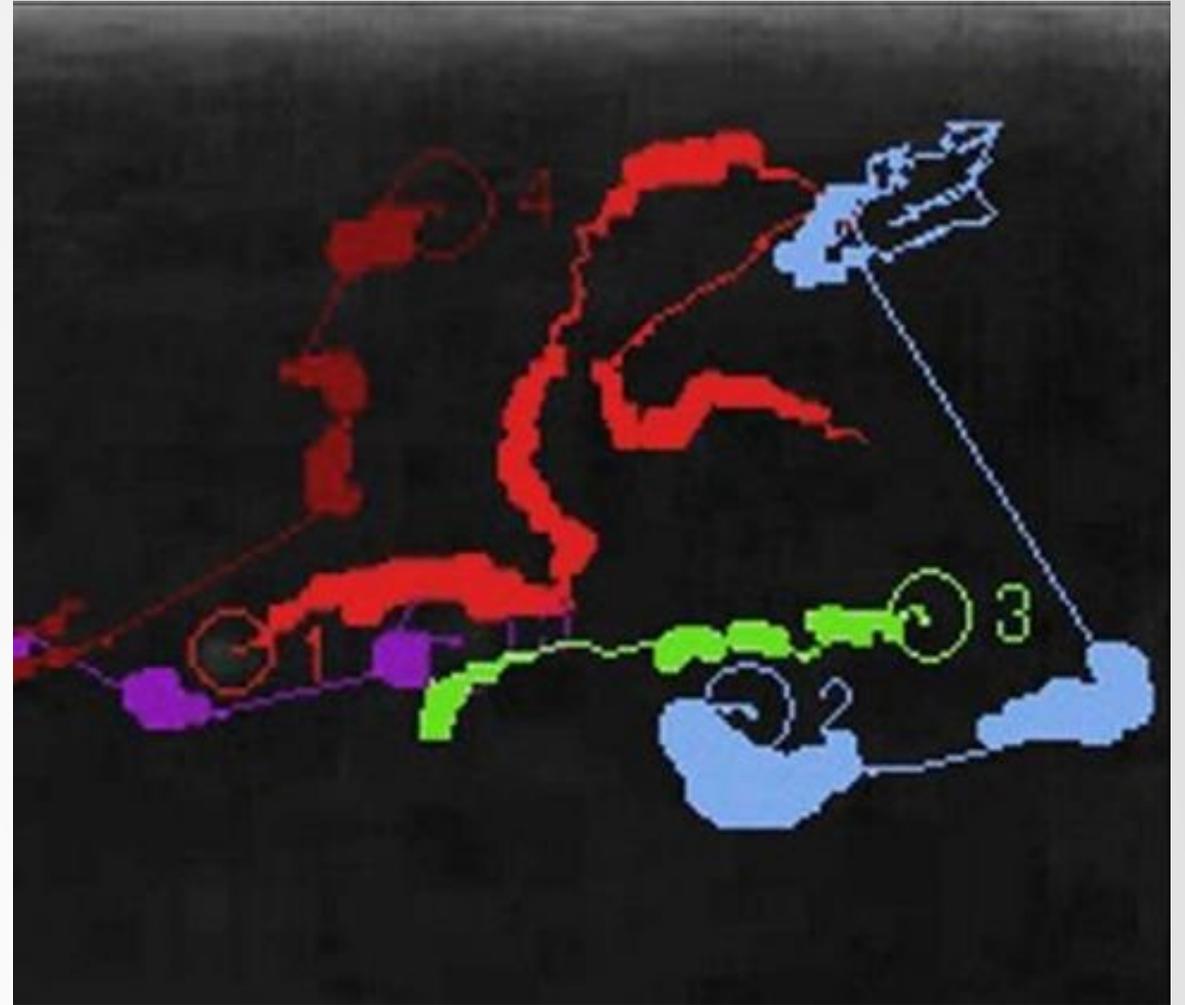




Immersive Fireflies



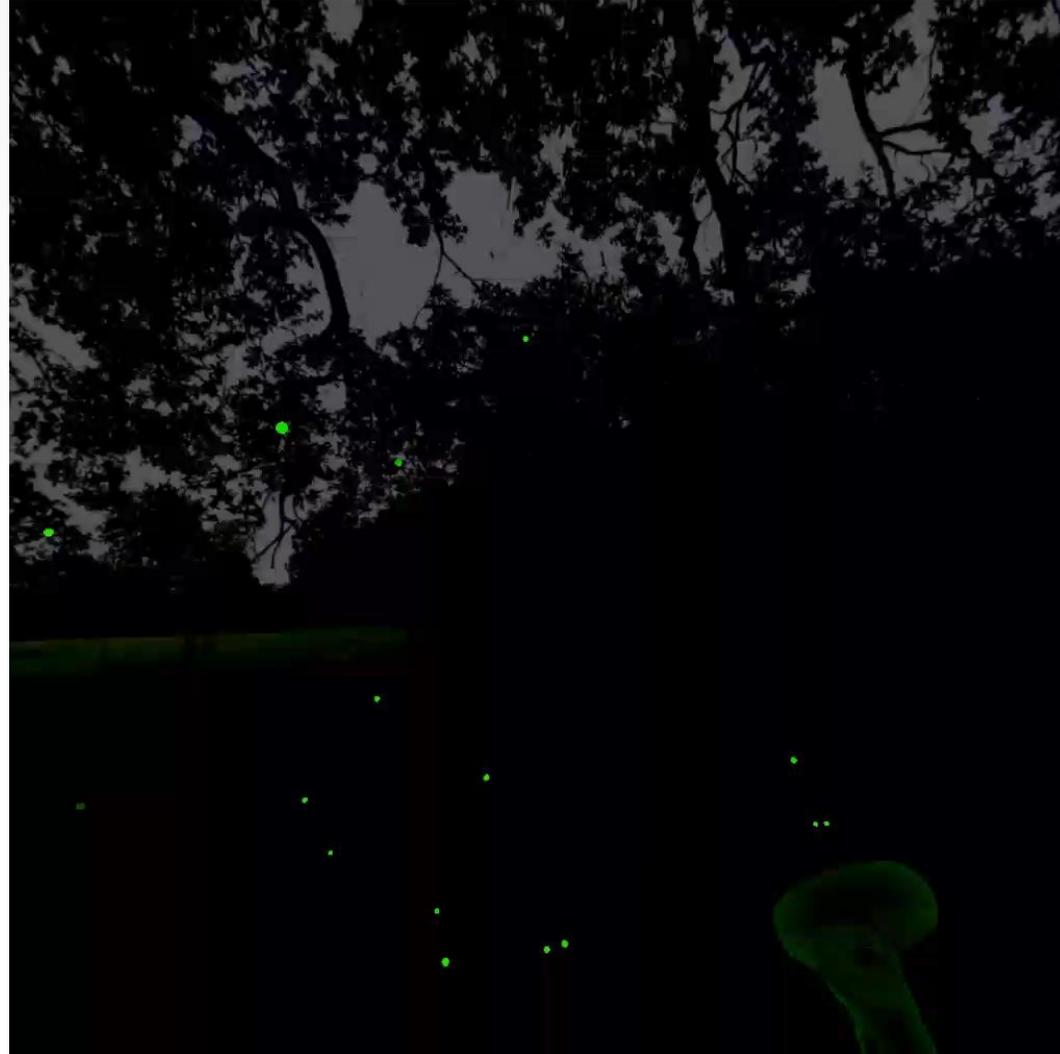
Lloyd, J, (1966), Studies on the Flash Communication System in Photinus Fireflies



TiLIA (Time-Lapse Image Analysis): a software package for the image analysis of firefly flash patterns, Olympus Corporation



Immersive Fireflies





Sara Lewis, Tufts University

Tufts
UNIVERSITY

School of Arts
and Sciences

Department
of Biology

The Lewis Lab

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Research

Overview

Sexual Selection Fireflies Flour Beetles

Nuptial Gifts

Hermit Crabs

Past Research



Research

Sexual Selection in Fireflies

Fireflies are justifiably famous for their spectacular bioluminescent courtship displays. In North American *Photinus* fireflies, species differ both in male flash signals and females' flash responses ([see chart](#)). Firefly females most often mate with several different males during their short adult lives, so sequential episodes of sexual selection happen before, during and after mating. Our firefly research, which is funded by the National Science Foundation, is helping to elucidate several key features of this evolutionary process.



What makes a firefly attractive?

Using photic playback experiments, we've shown that females of *Photinus* fireflies differentially respond to male courtship signals produced by males of their own species. Females show directional preferences for longer pulse duration in single pulse species such as *Photinus ignitus*, while females in double-pulse *P. greeni* prefer faster pulse rates. We also documented that male mate choice occurs later in the mating season, as firefly males will preferentially mate with those females that carry more eggs. [View graph >](#)

How costly is bioluminescent flashing?

We used a combination of open-flow respirometry and field experiments to measure two potentially important costs associated with producing bioluminescent signals: elevated energy costs and elevated predation risk.

We discovered that from an energetic perspective firefly flashing (without flight) is surprisingly inexpensive; metabolic rate measured during flashing was comparable to that during walking. However, field experiments revealed a striking cost of bioluminescent signals from specialist predators: simulated courtship signals attracted many more predators (*Photuris* female fireflies) compared to non-flashing controls.





Sara Lewis, Tufts University

...field experiments revealed a striking cost of bioluminescent signals from specialist predators: **simulated courtship signals** attracted many more predators (*Photuris* female fireflies) compared to non-flashing controls.



Firefly Femmes Fatales

Aggressive Mimicry in Photuris: Firefly Femmes Fatales

Abstract. Firefly females of the genus *Photuris*, long known to be cannibalistic, attract and devour males of the genus *Photinus* by mimicking the flash-responses of *Photinus* females. Although suspected, this behavior had not been observed previously.

While observing firefly behavior, several naturalists have noted that females of the genus *Photuris* are cannibalistic. Many, including myself, have discovered this by trying to keep groups of fireflies alive overnight in the same container. **In the morning one usually finds one *Photuris* female and bits and pieces of all the rest.**



Place Illusion and Plausibility

- The illusion of location has been referred to as telepresence or presence—the ‘sense of being there’, which we refer to as **Place Illusion**, *“It is the strong illusion of being in a place in spite of the sure knowledge that you are not there. Since it is a qualia there is no way to directly measure it.”*
- Plausibility is about the illusion that **what is apparently happening is really happening** (even though you know for sure that it is not). It is maintained through correlations between actions and reactions, and correlations between events

Mel Slater (2009), “Place illusion and plausibility can lead to realistic behaviour in immersive virtual environments”, *Phil. Trans. R. Soc. B* (2009) 364, 3549–3557



VR for Impact





Games For Change (G4C)



FESTIVAL GAMES WHO WE ARE WHAT WE DO COMMUNITY G4C STUDENT CHALLENGE

< BACK TO ALL GAMES



Tree

DEVELOPED BY New Reality Company

SUMMARY
Tree transforms you into a majestic rainforest tree.

RELEASE DATE 01.19.2017

TAGS
Environmental VR

Play

SYNOPSIS
In *Tree*, users experience the cycle of life through the lens of the natural world. Users enter the tree's body and perspective, beginning the installation as a virtual seed and growing to



Thank You

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