

For billions of years, all life has relied on Earth's predictable rhythm of day and night. It's encoded in the DNA of all plants and animals.



Light cycles affect the highly complex circadian rhythms that govern sleep, mating, migration, flowering, hunting, hibernation, plant budding and flowering, leaf drop, etc.

Day Shift

Night Shift



Diurnal

Nocturnal



Night Shift



Bees & butterflies

Moths & beetles



Night is a Habitat

About 70% of mammals are nocturnal

Designed for the night

Eye shine caused by their tapetum lucidum

Highly developed sense of smell & hearing



More than 60% of invertebrates are active at night



Artificial light at night has negative & deadly effects on many creatures including amphibians, birds, mammals, insects and plants.

Light pollution may be a driver of insect declines

How artificial light pollution affects insects:

Collision Exhaustion Incineration Dehydration Blinding of insects Increased predation Misdirection of oviposition **Disrupt interactions among species** Disruption of circadian rhythms, foraging, mating & reproduction

Nocturnal pollinators have been found to play an equally important role in crop pollination

More artificial lighting at night has been shown to reduce overall pollination rates

Nocturnal visits to plants was reduced by 62 percent in areas with artificial lighting compared to dark areas.

Regal Moth

Dark-spotted Palthis Moth

Spotted

Apatelodes

Moth

Scallop Moth

Saddled

Prominent

Moth

Orange-patched Smoky Moth

Bent-line Carpet Moth There are more than 2,400 species moths in Connecticut, compared to just 121 species of butterflies.

To see how many moth species we have, leave your porch light on and check!

The importance of moth caterpillars

6,000 to 10,000 caterpillars to raise <u>one</u> clutch of songbirds

Caterpillars (especially moth caterpillars) are baby bird food

Climate

North American Birds Are Shrinking, Likely a Result of the Warming Climate

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Artificial lights disorient moths, impairs finding mates, evading predators, and pollinating plants.

Light color matters!

Concentrations of bats and insects are found only over roads with white or bluish-white lamps.

Light color matters!

UK Study

Lighting reduced the numbers of caterpillars by between one-half and one-third.

Sites with white LEDs had a much greater reduction in the number of caterpillars compared to sites with sodium (yellow) lamps.

When exposed to nocturnal light, migrating monarch are disturbed when they should be resting, and appear to be disoriented next day.

Every spring, 3 billion birds migrate into the U.S. from Central and South America

Much of the migration happens in a short period of time — less than three weeks in spring and accounts for half of all spring migration.

Migration impacts

Birds that migrate or hunt at night navigate by moonlight & starlight.

Artificial light can cause birds to wander off course and head toward the dangerous nighttime landscapes of cities.

Building lights attract birds. They either collide with building or fly around them in circles and die from exhaustion.

Light-pollution in cities is deadly for birds

McCormick Place, Chicago

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APPO ______

Nearly 1,000 birds died October 3, 2023 after crashing into the windows at McCormick Place, due to a combination of the convention center's bright lights and the rainy weather On nights when the lights were out at McCormick Place, there were fewer dead birds on the ground the next morning.

Birds mortality can be reduced by simply by turning off lights during a handful of high-risk days each spring and fall

Halving the number of lighted windows could decrease collision counts up to 11 times during spring & six times in the autumn season. Turning out half the lights during migration seasons could reduce bird mortality at McCormick Place by 60%

In 2017, almost 400 passerines became disoriented in a Galveston, Texas, skyscraper's floodlights and died in collisions with windows.

West Nile Virus Transmission Cycle

Research shows that birds exposed to artificial light incubate West Nile Virus for twice as long, potentially increasing the occurrence of West Nile Virus in our cities.

Turn off unnecessary outdoor & indoor lighting from 11pm – 6 am

Especially during bird migration

Spring April 1 – May 31

Fall Aug 15 – Nov 15

www.lightsoutct.org

Peak firefly season Mid-June through mid-July

They need darkness to put on their show

Artificial light interferes with firefly mating

Sea turtle hatchlings

Artificial light can reduce their successful hatching by 20%

Artificial lighting reduced the number of calls reduced and movements of male frogs compared to frogs in unlit areas Significantly more salamanders actively foraged on the forest floor in the darker areas rather than in the lighted areas.

Wood frog tadpoles reared in the artificial light treatment, were larger, less active, more sensitive to road salt pollution and had more parasites.

Species-level distinctions – more research needed

Light pollution with additional stressors may have negative impacts on amphibian populations

Artificial night lighting also affects plants by extending the fall season or bringing on spring too early

What we are learning

Ecosystem Function

Species interactions, trophic cascades, nutrient cycling

Communities

Predator-prey interactions, Food web processes

Populations

Density, gene flow, home range size, intraspecific competition

Individual Behavior

Sleep/wake time, resource discovery, reproduction, communication

Genes /Cells

Hormone production, metabolism, cardiovascular systems, biological clock expression timing Bottom line: There is no such thing as wildlife-friendly lighting