

# Are the Bugs Out? Effects of Light Pollution on Nocturnal Insect Activity

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## INTRODUCTION:

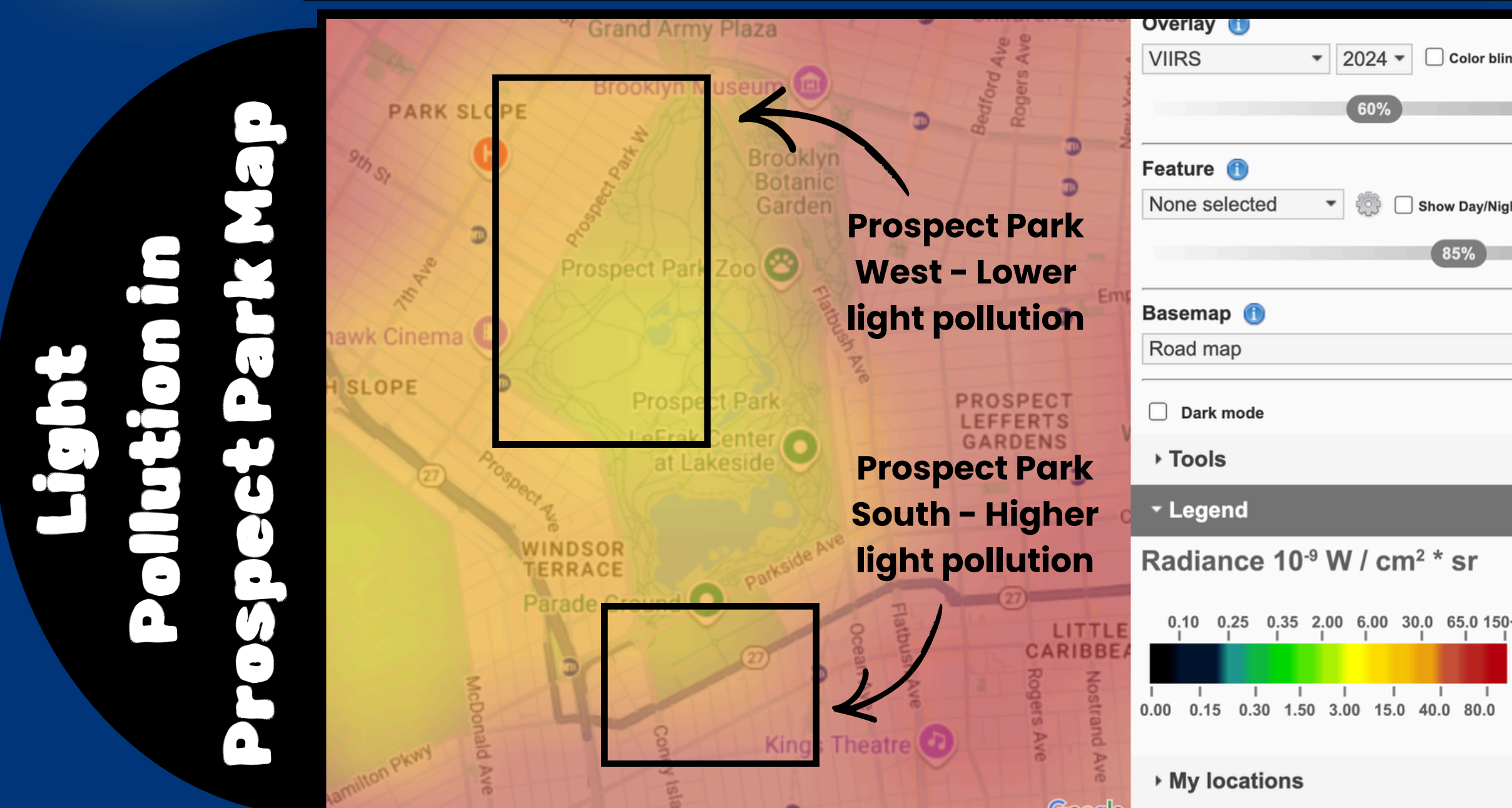
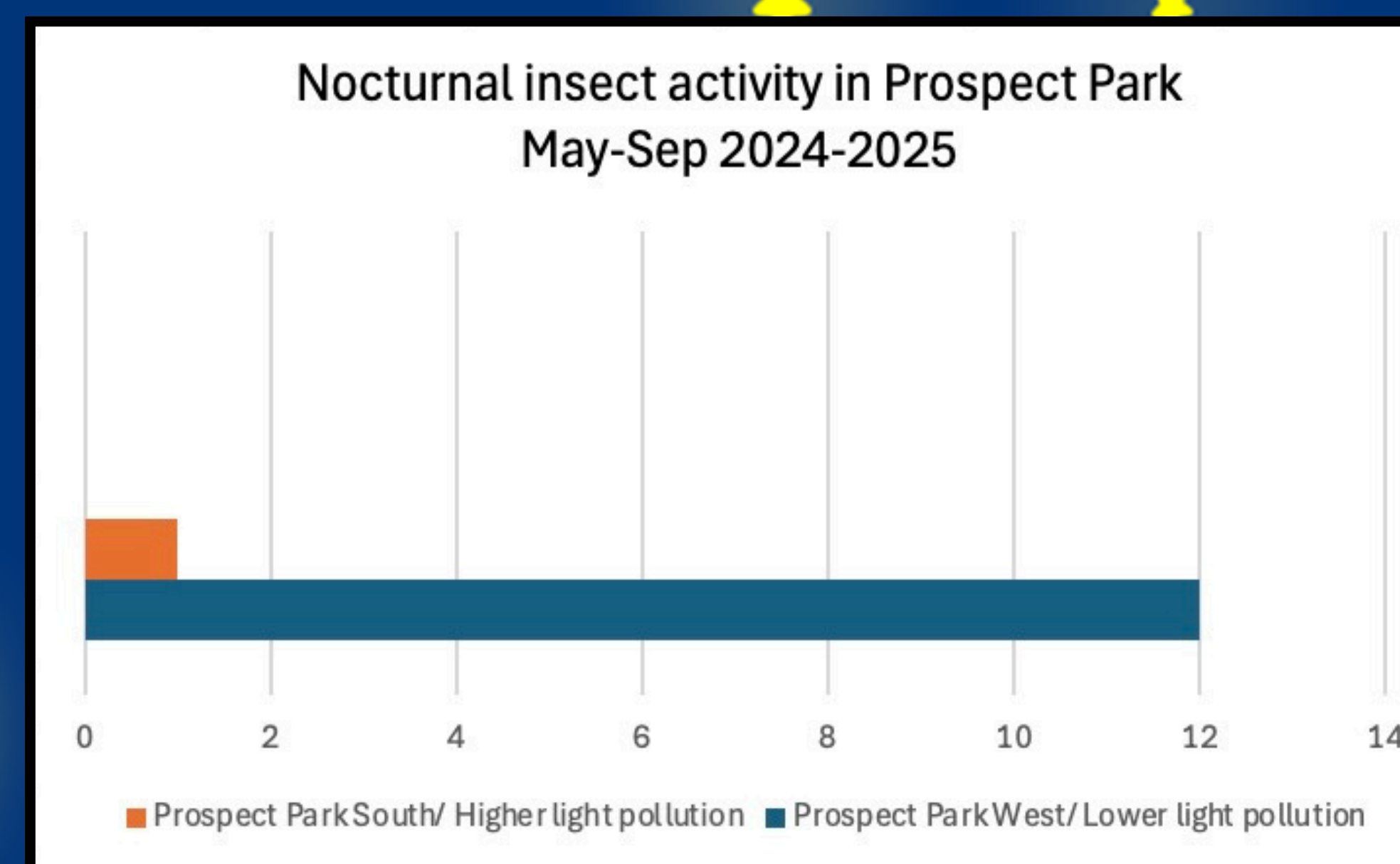
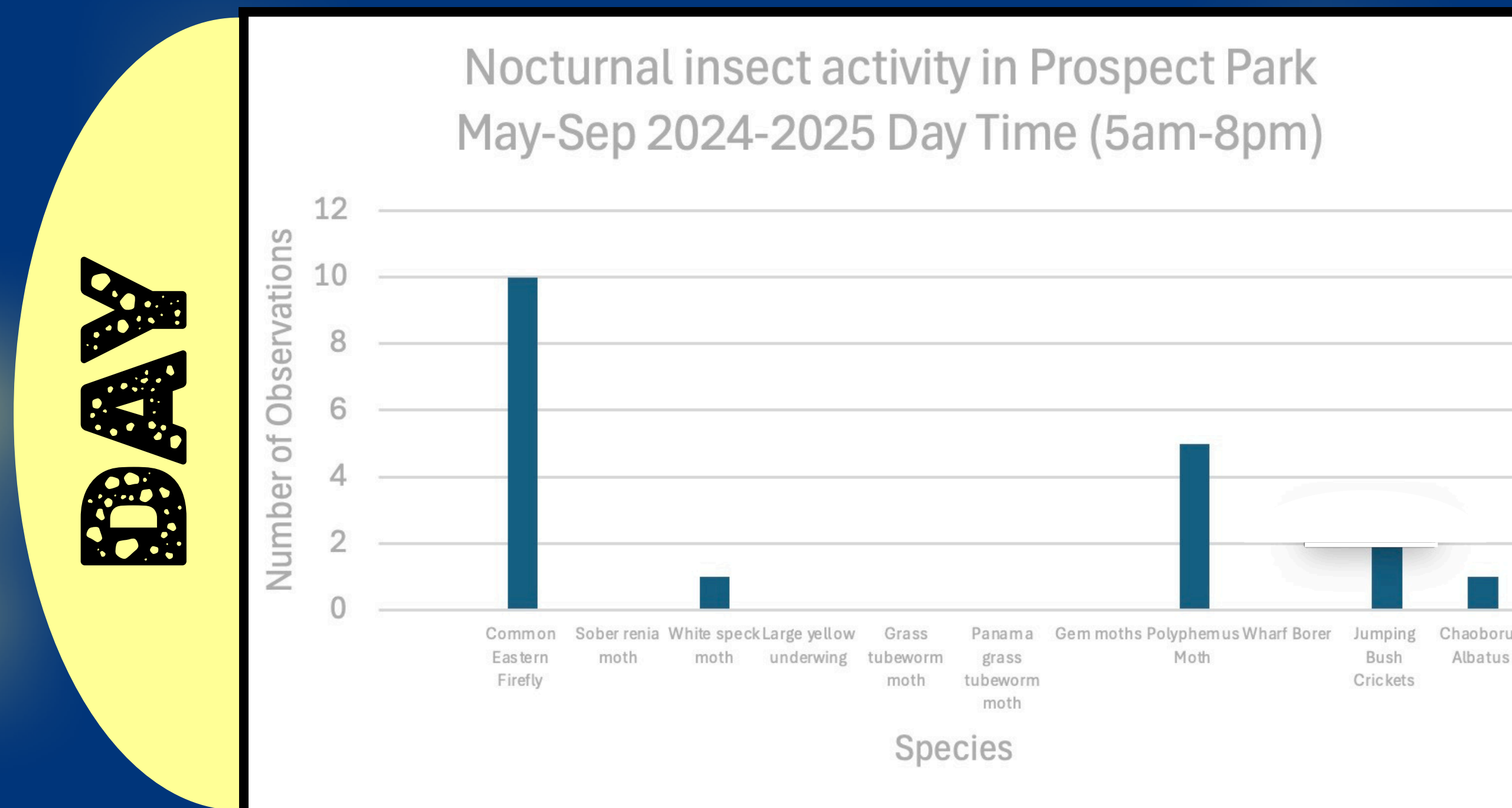
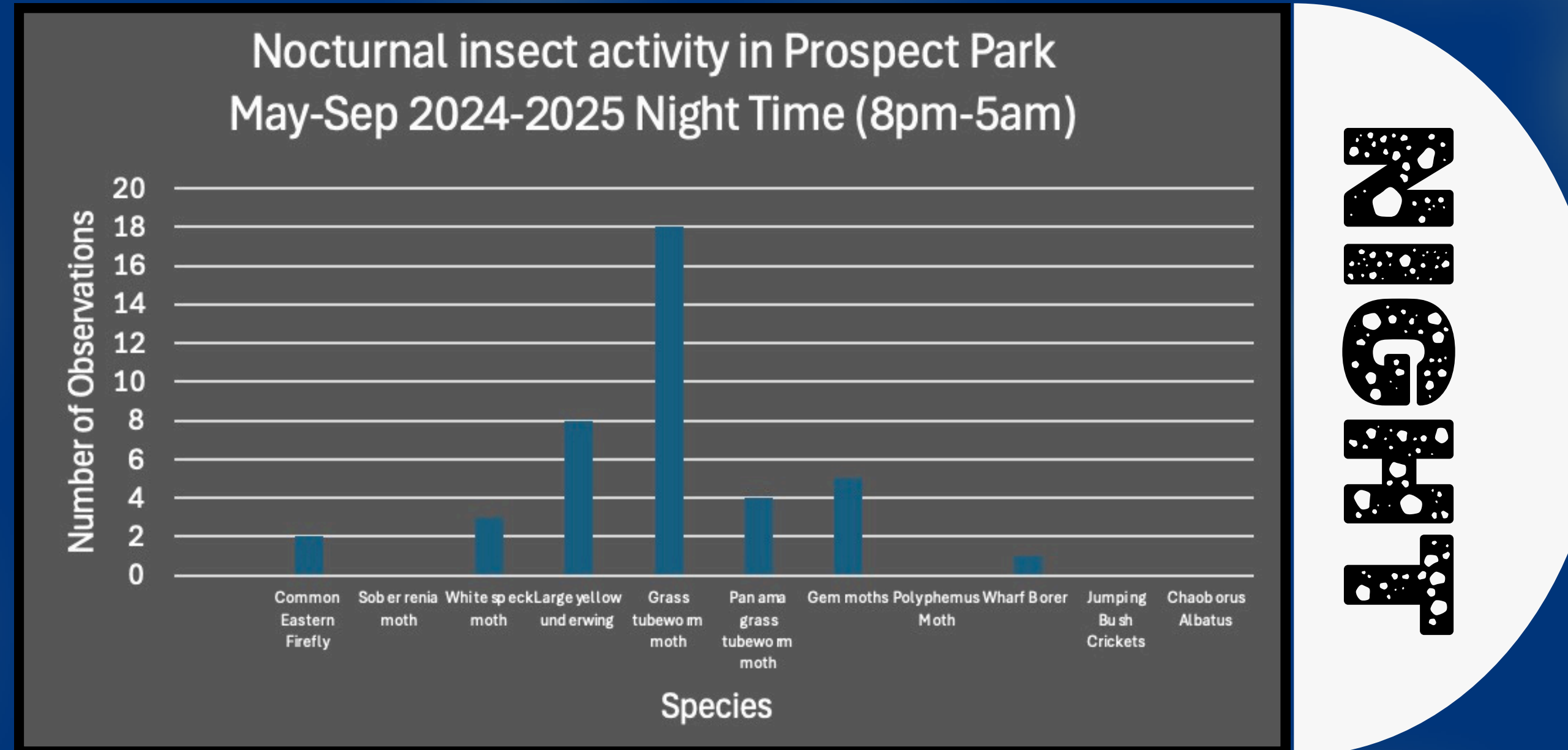
New York City, a bustling metropolis, has become almost infamous for its light pollution. This is largely due to the highly populated spaces and the need for electricity to run the megacity. Light pollution, which leads to undue harm; one effect is confusing nocturnal insects about whether or not it's nighttime. As residents of the city, it is not only important to reduce light pollution for our own wellbeing, but for the natural residents of the city too. We can start by investigating the extent of light pollution's impact on the behavior of nocturnal insects.

## HYPOTHESIS:

Nocturnal insect activity will be reduced in areas with high light pollution and increased in areas with low light pollution.

## METHODOLOGY:

1. Download research-grade iNaturalist observations for nocturnal insects (fireflies, moths, crickets) in Prospect Park from May-September, keeping timestamps and coordinates. The control group will be the daytime sightings of the respective species.
2. Convert timestamps to local time, select nocturnal (20:00-05:00) vs. control (10:00-16:00) observations, remove incomplete records, and map all observation points within the park boundary.
3. Obtain VIIRS night-light radiance data and assign designated areas as high or low light pollution based on respective radiant energy values.
4. Compare insect counts across different light levels while accounting for seasonal timing, weather, and observer effort; create visualizations to examine spatial and temporal trends.



## RESULTS AND CONCLUSIONS:

The analysis of data from iNaturalist proved quite useful. By reviewing sightings of 10 nocturnal species in Prospect Park, both during the day and at night, it became clear that light pollution may be a contributing factor to their habits. The polyphemus moth was a prime example, as it appeared three times in the afternoon (4:51PM, 2:38PM, 2:43PM). It was equally interesting that most insects appeared in the western area of the park; said region has notably lower levels of light pollution. As such, these results are potentially indicative of light pollutions' detrimental impact on nocturnal insects.

## LIMITATIONS & IMPROVEMENTS:

This study relied on opportunistic iNaturalist observations, which may be biased by observer availability, accessibility of park areas, and uneven sampling effort. Some species may have been underreported due to difficulty in identification or low visibility. Weather, moonlight, and other environmental factors could also influence insect activity, but were not fully controlled. Future studies could include standardized light-trap surveys, longer monitoring periods, and finer-scale measurements of light intensity to improve data accuracy and better isolate the effects of light pollution on nocturnal insects.

## SOURCES:

iNaturalist - <https://www.inaturalist.org/home>  
 NASA VIIRS Data - <https://www.lightpollutionmap.info/#zoom=13.64&lat=40.6626&lon=-73.9675&state=eyJiYXNlbWFWljoiTGf5ZXJCaW5nUm9hZCIsIm92ZXJsYXkiOiJ2aWlyc18yMDI0Iiwib3ZlcmxheWNvbG9yYlJpYmYXZzZSwib3ZlcmxheW9wYWNpdHkiOiI2MCIslmZlYXRlcmVzb3BhY2I0eSI6IjInO=>