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# Mapping Light Pollution at Utah State University

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## Effects of Light Pollution

One of the beauties of modern civilization is seeing the city lighting at night. It provides a feeling of security and is indicative of the power and endeavors of humanity, but over-lighting is a form of pollution. Many outdoor light fixtures spread light in all directions, sending a majority of the light into the sky, away from where we want the light to be on the ground. This light spreading upward is not only wasted energy and money, destroys our ability to view the night

sky, and has profound effects on nocturnal creatures. The direct harm to certain species then affects the ecosystem it interfaces with, causing damage on a much larger scale than expected. Small changes in lighting practices would positively affect energy use and economies, ecosystems, and the efficiency of astronomical endeavors. This project analyzes the light pollution on Utah State University campus and what can be done with collaboration of the collegiate administration to amend the lighting in Logan.

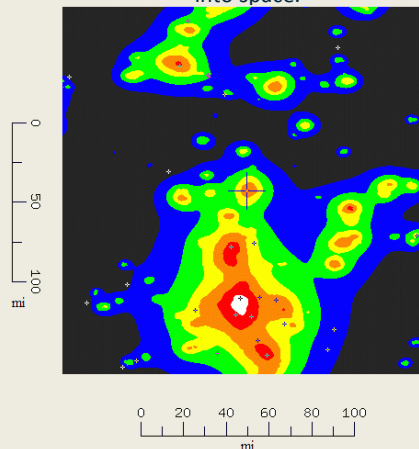


## Methods

In order to properly measure light pollution on Utah State University campus, I first need to measure levels of pollution and identify areas and major sources of light. The Sky Quality Meter provides that scale. The framework of this map is made from readings taken every 50 steps. I average three readings to account for error. Creating a light pollution map



**Figure 1 – Light Pollution of Northern Utah from satellite data.** This is very low resolution data, basically showing that Logan as a whole wastes light into space.

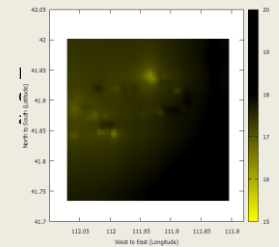


requires knowing where a measurement was taken, so I use a Rino 530 HCx GPS to pinpoint where I took each sky reading. To accurately conclude the effect of man-made lighting, measurements are only made on clear nights while the moon is not above the horizon.



## Results

While Logan is relatively rural, the distinct islands of light on this map are a signal of civilization. Most of the pollution occurs in areas with outdated fixtures. One of the brightest emissions of light is the library, located adjacent to the USU observatory. This makes astrophotography more difficult than it needs to be.

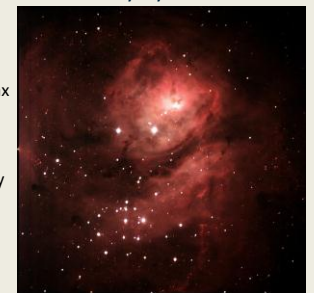


**Figure 2 – High Resolution Light Pollution Map of USU Campus**

## Conclusions

As a part of the Blue Goes Green program, USU has pledged to be cognizant of environmental issues. By doing so, USU now only installs light fixtures with minimal light pollution. Despite that, old lighting continues to harm the environment, waste tax dollars, and destroy the natural beauty of the night sky. Replacement of the inefficient fixtures will not only save money directly through efficiency, but also protect the environment and improve our capacity for astrophysical research.

**Figure 3 – The Lagoon Nebula imaged from the USU Observatory by Matt Wallace**



Northern Utah Light Pollution Image by P. Cinzano, F. Falchi (University of Padova), C. D. Elvidge (NOAA National Geophysical Data Center, Boulder). Copyright Royal Astronomical Society. Reproduced from the Monthly Notices of the RAS by permission of Blackwell Science.

