



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

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Project Title
Disappearing Night: Measuring Streetlight Illuminance (lux) vs. Sky Glow (Light Pollution)

Abstract

Objectives/Goals
The purpose of my project is to measure light pollution shining down from streetlights compared to the upward sky glow in Manteca, Ca. Cities across the world have streetlights contributing to sky glow, one of the fastest growing forms of pollution. Levels of inefficient outdoor artificial lighting increase about 20% every year. With data collected, I hope to provide awareness that there are realistic solutions to reform unproductive artificial night lighting practices. It is scientifically important because even though Manteca is a small suburban city, it still contributes to the halo of light polluting our sky.

Methods/Materials
Using a digital light meter, illuminance reflected off the asphalt of 75 random streetlights throughout Manteca was measured including a sample selection of each type of streetlight source: High Pressure Sodium (HPS) 70W, 100W, 150W, 200W, 250W, Mercury Vapor 175W and no light. At each pole, 4 illumination measurements and 8 star counts centered on Orion's Belt were made using a toilet paper tube. Data was recorded and an illuminance/sky glow ratio was calculated to determine overall light pollution.

Results
The illuminance range of all streetlights was from 0.4 to 22.3 lux. The highest output (HPS 250Watt) streetlight illuminance was 32 times greater than no light. The range of star counts of all streetlights was from 2.25 to 8.6 stars. The averaged overall star count for Manteca was calculated to be 4.93 stars which is less than the national average of 6 stars. The average overall light pollution for Manteca was calculated to be 3.2.

Conclusions/Discussion
Based on my result averages, the HPS 250 Watt significantly proves that inefficient lights contribute the most to sky glow light pollution. My data shows a positive correlation that more light output causes more pollution scattered into the night sky. This occurs because light cannot be contained and we put streetlights everywhere for our needs. We have to look at all types of light pollution and propose ways to reduce our contribution to the increasing light pollution.

Summary Statement
This project determines the overall sky glow light pollution from streetlights in Manteca, California based on the illuminance and star counts and shows evidence for a need to reduce our inefficient nighttime lighting practices.

Help Received
To Steve Probst, Superintendent of Public Works, Manteca for advice and direction. To my mom for driving and for her mentoring.