LOUD AND BRIGHT PROJECT INSTRUCTIONS
Light Measurement

Thank you for your participation in the Loud and Bright Project, a citizen science project of the University of California, Los Angeles (UCLA) and the Cornell Lab of Ornithology. This document provides information about the study and the instructions needed to collect data. Please read over the entire document and the attached handout before performing any of the tasks.

Introduction

Your participation will help the scientific community, through the efforts of Cornell's Lab of Ornithology and UCLA's Institute of the Environment and Sustainability, to better understand how birds respond to artificial night lighting. The Loud and Bright project is an attempt to fill the gap in our knowledge of how night lighting affect bird populations. Few citizen science programs have attempted to measure artificial night lighting in relation to bird populations, so you will be pioneers in this field.

Preparation

1. **Required Items**
    - **Charts** (included with these instructions)
        - For consistency when printing the brightness chart, use a LaserJet printer and be sure the toner is not low.
    - A piece of cardboard or similar item to hold behind the brightness chart
    - A watch or phone to determine your **time**
    - A means to determine your **longitude & latitude**. Such as:
        - GPS device
        - Smartphone capable of calculating longitude and latitude.
            - iPhones: WhereAmIAt?, L&L
            - Android phones: Compass
2. **Recording in the Dark**

    Because you will likely take measurements in dark locations, it may become difficult to write down your measurements. Here are a few suggestions for recording data in the dark.

    i. If possible, bring a companion to help write down your measurements while you read the brightness chart. They are free to use a small light while standing away from you, as long as it does not interfere with reading the brightness chart.

    ii. Astronomer's lights, or night vision flash lights, use a red bulb or LED that will not interfere with your night vision. You can use one to help write down your measurements after reading the brightness chart.

    iii. If available, use a voice recorder to record yourself reading the charts, and later write down and submit the results. Often cellphones include a voice recorder, and are also useable, but be careful when using them as the light from your cellphone may interfere with your night vision.

3. **Eyesight Quality**

   Because of the subjective nature of the brightness chart, you should only participate in this procedure if you have 20/20 vision, or corrective lens allowing 20/20 eyesight.

4. **Time**

   Light from the sun may interfere with measurements long before sunrise, and after sunset occurs. Measurements should be taken between two hours after sunset, to two hours before sunrise.
   If there are fewer than five hours between sunset to sunrise at your location, take measurements halfway between sunset and sunrise.

   - To find exactly when calculation may be taken:
     - Go to http://www.suncalc.net
     - Enter the date and your approximate location
     - Click the "More detailed >>" button in the top right corner
     - The time period listed as "night" is suitable for measuring

5. **Moon**

   Given the variability of moonlight between moon phases, moonlight intensity varies over the course of a month. To compensate for this variation, measurements should only be taken within one week before and after the new moon. If possible, take your measurements while the moon is still below the horizon.

6. **Clouds**

   Cloud coverage amplifies the brightness of the night sky by reflecting light back downwards. Brightness of artificial lighting may be considerably greater due to the reflectivity of clouds, which enhance the effect of skyglow and increase light pollution. Therefore, it is important to indicate your geographic setting and estimate cloud coverage. If nearby structures (trees, buildings, etc) obstruct more than 25% of your view of the sky, preventing you from accurately estimating cloud coverage, record cloud cover as Obscured.

7. **Brightness Chart**

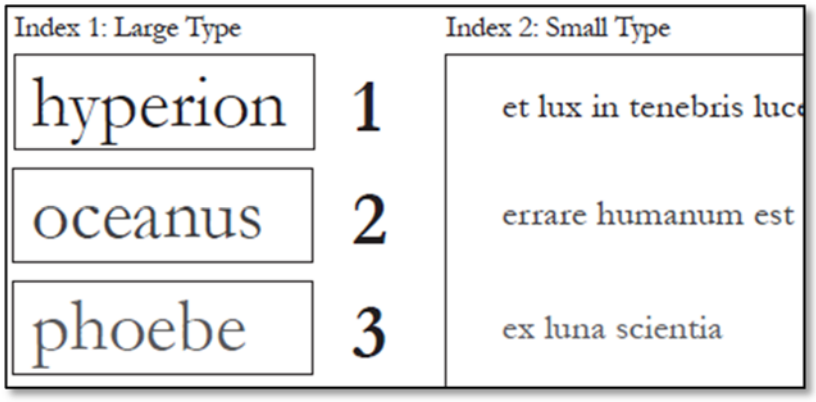
   The brightness chart is designed to measure of the amount of light illuminating an area. Illumination is a property of light that describes the brightness of a specific area. The brightness chart includes four different scales (indexes) that you will use to measure brightness. The various objects on the chart will be visible at different light levels, allowing you to estimate how much light is shining on the area.
   The brightness chart will need a non-transparent board behind it while you take your measurements, such a piece of cardboard, to prevent light from shining through from the back of the sheet.

Using the Brightness Chart

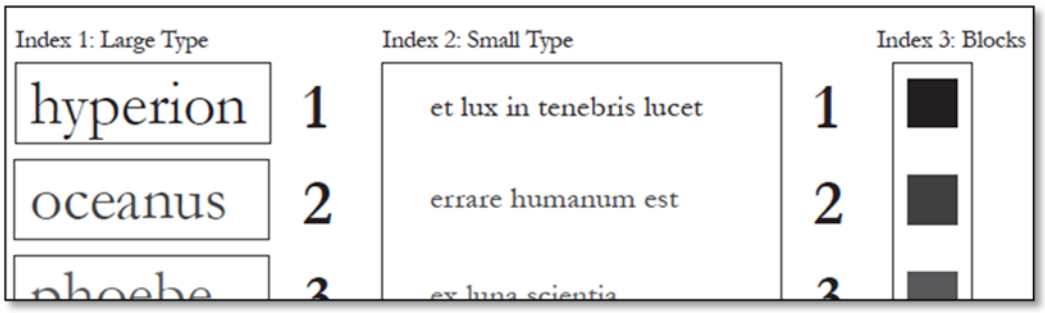
You will use the brightness chart by holding it in five different directions: the four cardinal directions (north, east, south, west), and once looking down with the face of the chart directed toward the sky. You will try to hold the chart so that your body does not block the light coming from behind you while you read the chart. To read the chart, you distinguish the faintest item in each of the four indexes. Wait at least **10 minutes** in your location before reading the chart for your eyes to adjust to the surrounding light.

1. *Holding the chart*
   a. To use the chart facing the four cardinal directions (north, east, south, west): look to the north and hold the chart away from your body with your arms fully extended, while keeping the chart exactly **vertical**. Then lift it just high enough to clear the height of your head, while keeping your arms fully extended. From this position, distinguish the faintest item in each index.
   b. To use the chart facing the sky: hold the chart with your arms fully extended and rest the bottom edge of the chart against your legs, with the face of the chart towards the sky, while keeping the chart exactly **horizontal**. If the shadow of your body falls on the chart, turn your body until your shadow does not cover the chart. From this position, distinguish the faintest item in each index.

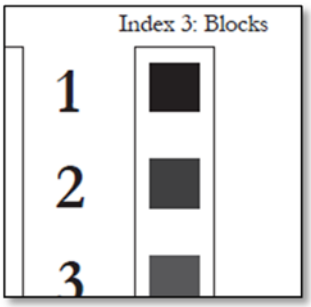
2. *Reading the chart*
   - For each index, you are attempting to distinguish the faintest items you can see.
   - For index 1 and 2 (the large and small type), you must be able to distinguish individual letters of the item to count that item as visible.



   - From index 1, 2 and 3, record the number next to the faintest item.



- From index 3 (blocks), you must be able to distinguish an individual block to count that item as visible.



- From index 4 (stars), record the number of visible stars.

Measurements

1. ***Location Data***
    a. Record the time and date at the start of your measurements.
    b. Record your longitude & latitude as accurately as possible.
2. ***Environmental Data***
    a. Record the number of nearby light sources. Use your best judgment to approximate the distance of the light sources.
        - For example, if you are right underneath two street lamps, place a number 2 in the 0 ft. category. If you see three light sources between 50 and 100 feet away, write a number 3 in the 50-100 ft. category.
    b. Briefly describe the dominant light source.
        - Dominant light sources can either be many sources of the same type. For example, 10 street lamps. They can also describe one light source that has high intensity. For example, outside building lighting.
    c. Record the current visible cloud cover using the cloud coverage chart.
    d. Record the current phase of the moon if it is visible. If the moon is not visible, record as Not Visible.
3. ***Brightness Chart***
    Use the brightness chart to determine the amount of illumination at your location. Follow the steps under the Preparation section to learn how to use the brightness chart.

Submit data

Option 1: Loud and Bright Project Website

1. Go to www.LoudandBright.wix.com/LABP
2. Click "Submit Data" located at the top right of the screen
3. Click "Light"
4. Fill out the form, using your data sheet as reference
5. Click "Submit"

Option 2: Send Data Sheet by Mail

Loud and Bright Project
c/o Dr. Travis Longcore
UCLA Institute of the Environment and Sustainability
300 La Kretz Hall
Los Angeles, CA 90095-1496

How To Download Smartphone GPS Apps

To download the iPhone apps

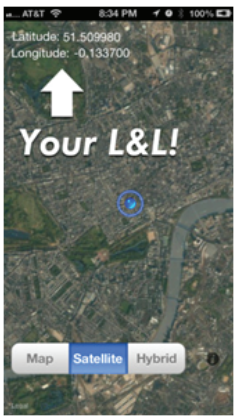
1. On your iPhone go to the “App Store” icon.

2. In the search bar, type L&L. The app should pop up and look like this.

Click on the app from the list, and press the Install Now button.

3. Itunes might prompt a password page. Input your password and it should automatically download to your home page.

4. Click on the app and once it opens, in the upper left corner is the longitude and latitude.



Optional alternative iPhone GPS app:

5. For WhereAmAt? App follow the same instructions as downloading the L&L app.

6. Once it is installed, open the app. It will show you your location with a blue dot. The latitude and longitude is in the upper left corner.

To download the Android phone apps

1. To download the Compass app. Click the GooglePlay icon.

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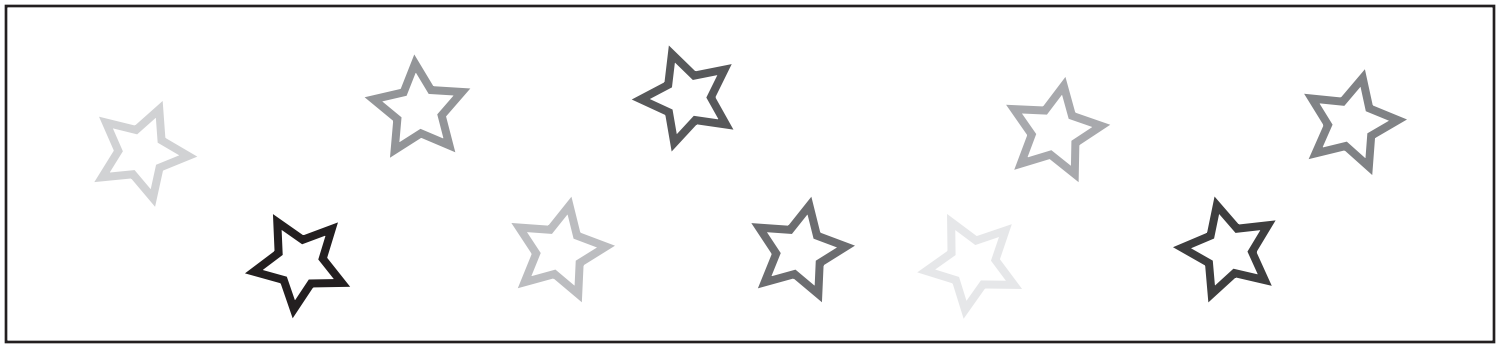
2. From the search bar, type “Compass”, and locate this app.

3. Click on the app on the home screen to open it. Once open the longitude and latitude will be displayed on the lower left corner.

Brightness Chart v4

Index 1: Large Type		Index 2: Small Type		Index 3: Blocks
hyperion	1	et lux in tenebris lucet	1	
oceanus	2	errare humanum est	2	
phoebe	3	ex luna scientia	3	
themis	4	carpe noctem	4	
asteria	5	contra spem spero	5	
eurybia	6	concordia salus	6	
helios	7	audentes fortuna iuvat	7	
lelantos	8	nil volentibus arduum	8	
ophion	9	auribus teneo lupum	9	
selene	10	eheu fugaces labuntur anni	10	

Index 4: Stars



Light Measurement Data Sheet

1. Location Data

Time _____ Longitude _____

Date _____ Latitude _____

2. Environmental Data

a. Light Sources

	0-1 ft.	1-10 ft.	10-50 ft	50-100 ft.	100+ ft.
# Sources					

b. Briefly describe dominant light source.

c. Cloud Cover

Cloud Cover	Cloud Coverage	
No Clouds	0%	
Clear	1-10%	
Isolated Clouds	10-25%	
Scattered Clouds	25-50%	
Broken Clouds	50-90%	
Overcast	90-100%	
Obscured: >25% of the sky is obstructed from view		

d. Moon Phase

Moon Phase	
New	
Cresent	
Half	
Gibbous	
Full	
Not visible	

3. Brightness Chart

	Index 1	Index 2	Index 3	Index 4
North				
East				
South				
West				
Down				