Light Pollution - Projects - How Dark is My Sky? – 1/4

The Big Dipper, part of the constellation Ursa Major, is a well known and useful group of stars for determining the clarity of your skies at most times of year. This group is easily identified and is above the horizon for most people in the northern hemisphere every night.

However, it is best to view it directly overhead or at least fairly high in the sky if you are trying to determine the clarity of your sky using star magnitudes.

With all that we have learned about light pollution, the question most of us ask is 'How dark is my sky?'

Since most of us live in towns or cities, we can expect that we are not looking at pristine skies but are seeing far less than we could see if we were in a rural area far from towns or cities.

One activity that is easy to do and can be done by everyone from children in upper elementary to adults is to use the stars to determine how clear your night sky is. This simply involves comparing the stars you can see with your eyes with a map of that part of the sky. The map has the various magnitudes (or brightness) of some of the stars listed. Brighter stars have lower values, dimmer stars have higher. A star of magnitude 1 is brighter than one of magnitude 2 or 3.

In most cases, younger people will be able to see slightly dimmer stars than those who are older. Our eyes change as we get older and becomes less sensitive. However, don't let that stop you from trying this little exercise. It is easy, requires little time and will indeed be rewarding, even if you get to spend a few minutes outdoors under a star-filled sky enjoying the universe.

Sky conditions change from day to day in any locality and, if you do the exercise over a period of time, you will find some nights are definitely better than others and some are worse. As well, local lights, smog and smoke, dust and other pollutants all change from day to day and alter the seeing conditions.

In the most light polluted towns and cities one can only see the sun, moon, brightest planets and a few of the brightest stars. As one leaves the city and heads far into the country more, dimmer stars are visible and we finally get to see the sky as it was since time began. Eventually, the sky will be dark enough to see the Milky Way and the knots and whorls of dark dust and gases running along its length. On moonless nights the sight is overwhelming as one sees the light from thousands of stars - a sight that most people in modern times have never experienced.

Once you have seen truly dark skies, you become very aware of what you have been missing. Light pollution from streetlights, residences, businesses and industries all serve to dim the stars and prevent their true beauty from showing through.

If one knows an area of sky and has a star map with magnitudes indicated, you can determine the relative clarity of the sky by finding the dimmest star you can see according to the map.

The brightest stars have the smallest number or magnitude. As stars get dimmer their magnitude (number) increases. The range in magnitude in the Big Dipper is from the brightest star in the Dipper, Alkaid, at magnitude 1.9 to the dimmest star indicated, 7.0, and beyond. You will notice that the number of dimmer stars far exceeds those that are brighter. Most humans with excellent eyesight, under excellent conditions, are able to discern stars around magnitude 6.

The photograph of the Big Dipper (next page) is presented in both positive and negative formats in order to help you easily identify stars and their magnitudes.

Getting Started:

- Choose a night that appears to be clear.
- Wait until at least an hour or more after sunset.
- Choose a site that is free from direct lighting from streetlights or other lights.
- Let your eyes dark adapt for at least half an hour. Get to know the sky during this time.
- Locate the Big Dipper in the sky. Preferably it should be at least within 45 degrees of the zenith (directly above).
- First, locate the brightest stars in the Big Dipper, noting their magnitudes, then try to find increasingly dimmer stars. To locate the dimmer stars, first check the map of the particular area then sweep the area slowly with your eyes. Moving your eyes from side to side will help you locate the star as the light from the star falls on more sensitive areas of your eye. Looking directly at a dim star or object in the sky reduces the ability to see it or will even make it disappear!

Note the magnitude of the dimmest star you can see. You may wish to use binoculars/telescope to verify that you really can see the star in question. (No cheating!) Note the sky conditions as well. (Note the 'double star,' Alcor and Mizar, located at the Dipper's bend. See if you can separate them.) Your best chance of seeing the dimmest stars is when the Big Dipper is directly overhead. At this point there is less air (and pollution) for the starlight to go through, improving your chances.

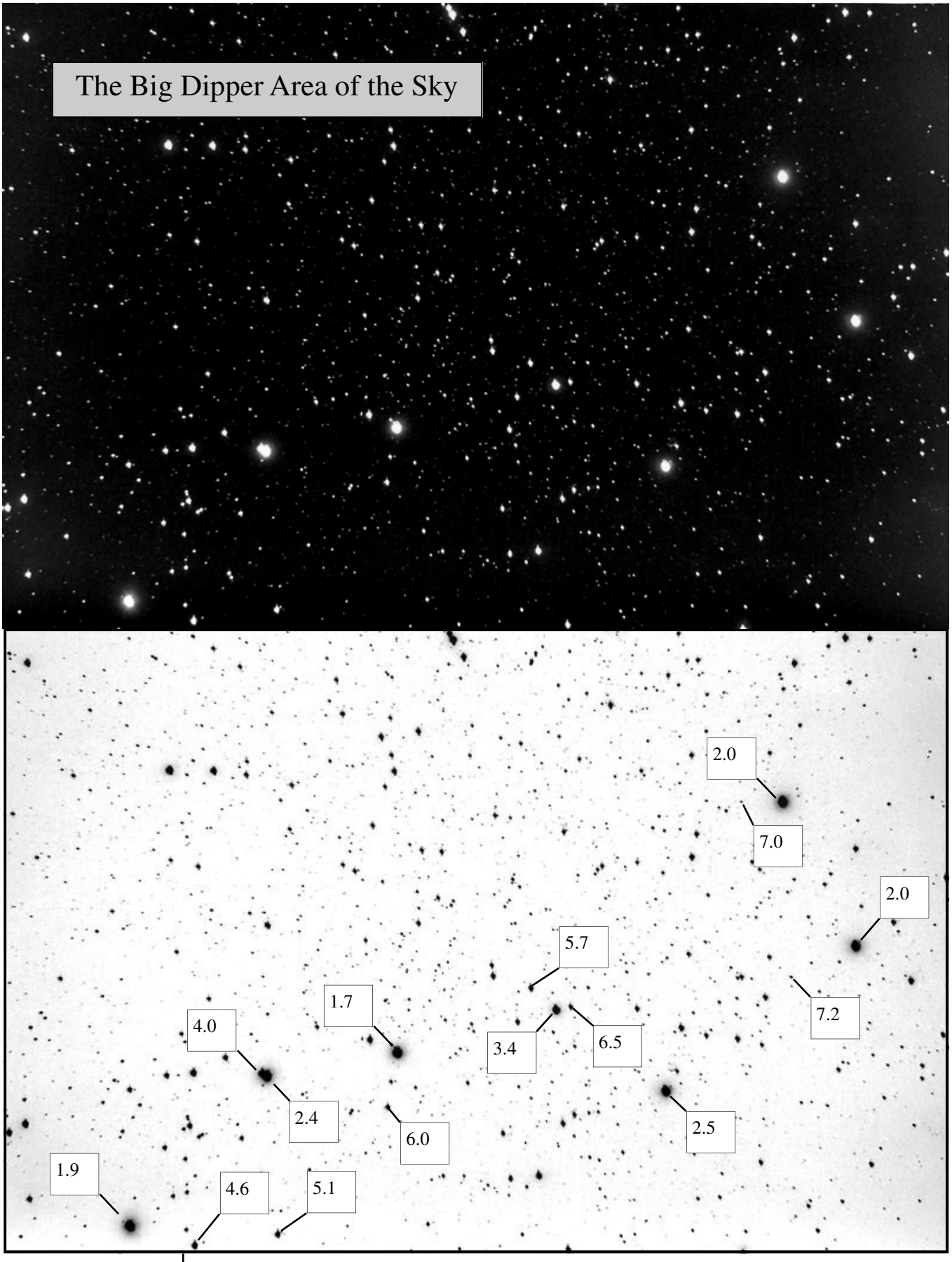
Try to take several observations over the period of the evening. You may be surprised to see that the 'seeing' can improve or degrade quite quickly. Use the magnitude of the dimmest star seen as your 'score' for the night.

It is preferable to do these observations on moonless nights as the moon contributes significant light pollution. Cloud, haze, smoke, smog, fog, dust, ice fog, etc. can make a significant difference in finding the dimmest stars. Note your sky conditions.

Do this exercise with friends or family members. Compare your observations with those of the others. As eyesight varies from person to person there may very well be a difference in the magnitudes of the dimmest stars observed at the time. If possible, also try doing this exercise in different locations, urban and rural. You will be amazed at the difference a few lights can make to the quality of the night sky.

Download and use the free, excellent star map program called HNSKY from:
http://www.hnsky.org/software.htm
This program indicates the magnitude of the stars shown just by clicking on them.

For another exercise of this type, you may wish use the following link to Globe at Night:
http://www.globeatnight.org/index.html


The Big Dipper Area of the Sky
2.0
7.0
2.0
5.7
1.7
7.2
4.0
3.4
6.5
2.4
6.0
2.5
1.9
4.6
5.1

Name: _____

Data Sheet - Finding the Dimmest Star

Date:	Time:	Place:	Sky:	Mag.:

Use the above grid to record your observations. Under 'Sky' indicate the condition of the sky - clear, hazy, partially cloudy, scattered clouds, foggy, etc. Under 'Mag." indicate the magnitude of the dimmest star you were able to see. To protect your night vision use a red light (red cellophane over a flashlight will do) to see the maps and record your entries. Make multiple copies of this sheet and have others in the group record their observations as well. Compare your notes later and determine who got the best score (star of the lowest magnitude).