Weather Photography

Willard Sharp Photography

Who Am I?

- Owner & founder of willardsharpphotography.com
- Network architect by day. Weather and photography junkie the rest of the time.
- Chaser of storms, Milky Way, aurora and night skies.
- Storm chaser for Iowa Storm Chasing Network.

Disclaimer

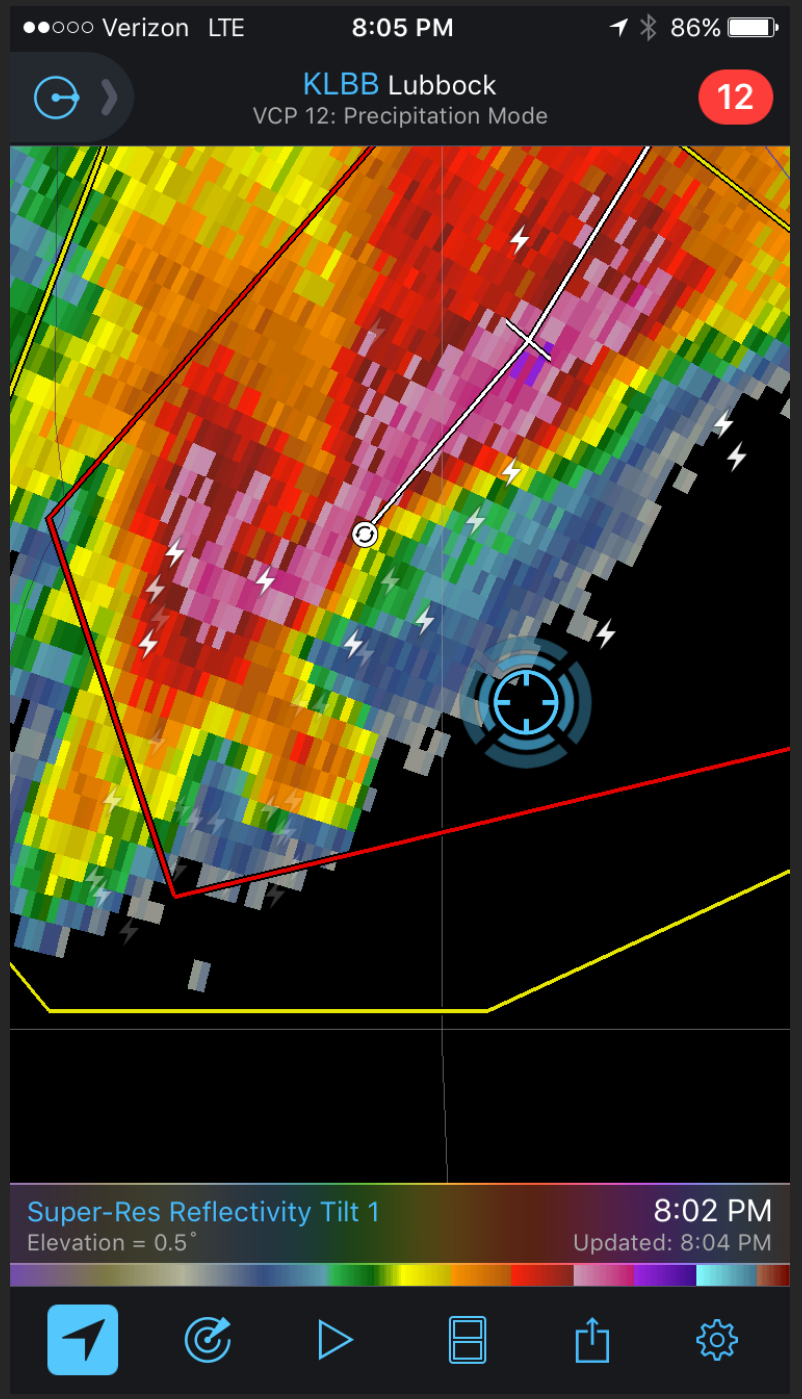
- Photographing thunderstorms, tornadoes, flash flooding, hail, or lightning is dangerous! Lightning can strike miles away from the storm. If you hear thunder you can get struck!

- Only storm chase after you have mastered basic meteorology on severe weather forecasting and you have taken a spotter training course. These are offered by the local NWS office.

- Or ride along with someone who is an experienced storm chaser. Listen to their instructions.

If You Choose to Photograph Storms

- If at all possible don't chase alone.
- Chase with a well maintained vehicle.
- If you chase on gravel your vehicle will get dirty.
- Stay off mud roads.
- When you approach a storm have a predetermined escape route.
- Don't core punch!
- Obey all traffic laws!
- Be prepared for lightning, heavy rain, hail, strong winds, tornadoes, or flash flooding.



Why do I chase storms?

Storm Chasing Goals

Have goals in mind for your storm chase. I want photos of?

- A tornado
- Structured storm against a nice landscape
- Lightning
- Sunset after the storm.
- An old barn or building in the foreground with a storm behind it

Storm Chase Gear Checklist

- Batteries charged and packed.
- Pack charging equipment.
- Camera lens and equipment clean and in functioning order.
- Pack the lenses you need. Wide angle to telephoto.
- Equipment cleaning products.
- Tripod for low light situations or for stable video.
- Rain protection for equipment.
- Silica packs to help equipment dry.

Camera Settings

SO WHAT DO THOSE LETTERS ON THE TOP DIAL MEAN?

Before you start moving the top dial around, take some time to get your head around what all those letters and functions do

P: Program
Sets both the shutter speed and aperture automatically, but still allows you to adjust the exposure and tweak other important creative settings.

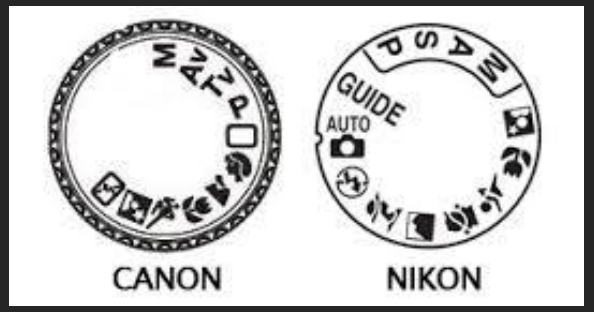
A or Av: Aperture Priority
This controls depth of field. Wide apertures (eg, f/2.8) let you blur the background; narrow ones (eg, f/22) keep the whole scene sharp.

S or Tv: Shutter Priority
Lets you control how long the shutter stays open for. Fast shutter speeds freeze motion; slower ones blur water or motion, for example.

M: Manual
You set aperture *and* shutter speed. In Av mode, the SLR will still set the shutter speed for you when you select an aperture, and vice versa in Tv mode.

Auto/Green Square mode
The camera sets both the shutter speed and aperture. There is no access to exposure adjustment or other key settings. Try to avoid!

Scene modes
These fully automatic modes choose settings suitable for specific subjects and shooting situations, such as portraits, but you can't change many settings.



General Daytime Weather Settings:

Mode	ISO	Aperture	Focus
Aperture Priority	100	f/6.3 – f/11	Auto

- Things happen fast. Slow down, concentrate, and compose your shot!
- The focus point should be towards the horizon.
- Keep the horizon level.
- Try to have some subject matter in the foreground.
- Try to stay below f/11. Going higher will introduce diffraction.
- Light conditions will change through the day. Be ready to adjust camera settings as needed.
- Verify that camera metering is set to sample the entire image for correct exposure.

General Daytime Weather Settings:

Mode	ISO	Aperture	Focus
Aperture Priority	100	f/6.3 – f/11	Auto

- Use matrix metering for weather photography.
- Light conditions are often times difficult.

Unprocessed RAW File

Processed in Lightroom

General Daytime Weather Settings:

General Daytime Weather Settings:

- Experiment with your camera settings. Try different things. Practice! Practice! Practice!
- Keep the ISO low to keep noise out of the photo.
- Only increase ISO when the daylight is becoming dim and your shutter times are too long.
- Always shoot in RAW. Pixels count!
- Consider multiple shots for HDR processing.

Post Processing

Lots of variety here. Don’t get too liberal with changing settings. Keep the photo as real looking as possible while bringing out the contrast in the clouds/landscape and bringing out the colors. In general adjust:

- Contrast
- Lower highlights if the clouds are too bright.
- Bring up shadows if the landscape is too dark. Don’t bring it up too high or noise will be introduced.
- Bring up clarity enough to bring out the definitions in the clouds.
- Bring up vibrancy to bring out colors. Don’t oversaturate!
- Adjust white balance if needed.
- Adjust exposure if needed.
- Explore all the different settings and see what they do. But remember keep the photo looking as real as possible.

General Daytime Weather Settings:

How to Ensure Your Smartphone Weather Imagery Rocks…

First, slow down. Take a couple of extra seconds. Think through your composition and framing. Most cell phones have a fixed lens, but you can work around that with an accessory like the Olloclip Active. Regardless take a few seconds to actually pay attention to your shot.

Realize the Technical Limitations. Some scenes are going to be hard to capture with your phone no matter how creative you are. This means you have to make compromises. When in doubt, expose your subject above all things.

Get an easy to use image editing app. Your base shots out of the camera in an iPhone, Galaxy, etc. are still a hair flat and could have their detail spiced up a bit. On my iPhone I use both Snapseed and Afterlight to give my pics a bit of a boost.

Take advantage of pro level apps for video editing and shooting. They exist and are out there. Some allow you to record in a much higher bitrate and also with different frame rates than the base level of your camera. For video at least, this is a good idea to look into.

Accessorize! Cell phones aren't professional style solutions out of the gate, but they can be with a few simple accessories. Personally, Consider these accessories: Rode smarLav+, Joby Gorillapod, and the Olloclip Active. There are numerous other great accessories for your phone you can find and try out too, the market is huge and continues to grow.

Nighttime Lightning Settings:

Mode	ISO	Aperture	Focus
Manual	100 – 400	f/5.6 – f/11	Manual

- Keep ISO low for less noise. Bring it up a little of you want to foreground lit better.
- Auto White Balance
- The closer the lightning the higher the F Stop.
- Use sturdy, well centered tripod with remote shutter release
- Rural areas:
    - Use f/5.6-f/10 for exposure 6 sec to bulb.
    - Can shoot in bulb mode due to low ambient light.
    - Distant lightning may require wider open f-stop.
    - Manual focus on infinity.
- Urban areas:
    - Use f/5.6 for exposure of 6-8 seconds
    - Use f/8 for exposure of 10-13 seconds
    - Test scene first without lightning.
    - Manual focus on distant light source (infinity or close to).

Daytime Lightning Settings:

Mode	ISO	Aperture	Focus
Aperture Priority	100	f/6.3 – f/11	Auto to Manual

- Daytime lightning is one of the most challenging scenes for a photographer to shoot.
- Set Aperture and Shutter speed for scene.
- Use sturdy, well centered tripod with remote shutter release to make things easier.
- Lightning is very fast. In the daytime consider using a lightning trigger. Triggers on infrared pulse.

- ND filters can be used to lengthen the shutter speed.

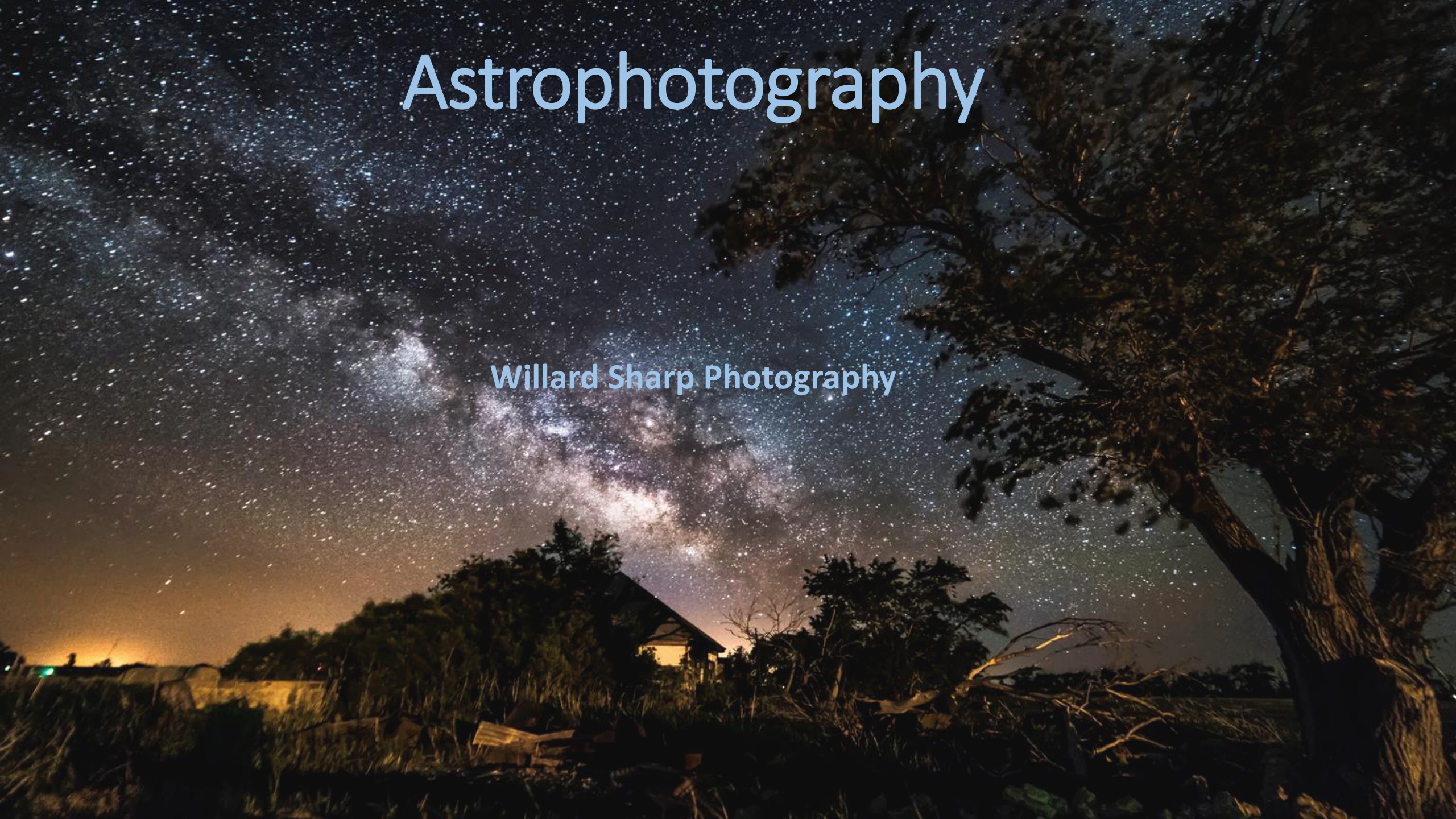
Videos

- Not as many settings here to adjust. But here are some you should look at.
  - Focus to infinity.
  - Set white balance to a setting that works best for outdoor shooting.
  - Wind reduction on for the mic or use external mic with dead cat wind muff.
  - Set camera for highest video quality possible. HD 1080P or 4k
  - Tripod with good quality pan/tilt head for steady shooting.

Don’t Fall Victim to Equipment Envoy

- Get to know your camera. Understand all the features and know its limitations.
- Even the most basic DSLR camera or smartphones will take spectacular photos if you master the basics of camera operation and composition. Don’t fall victim to equipment envy!

Astrophotography



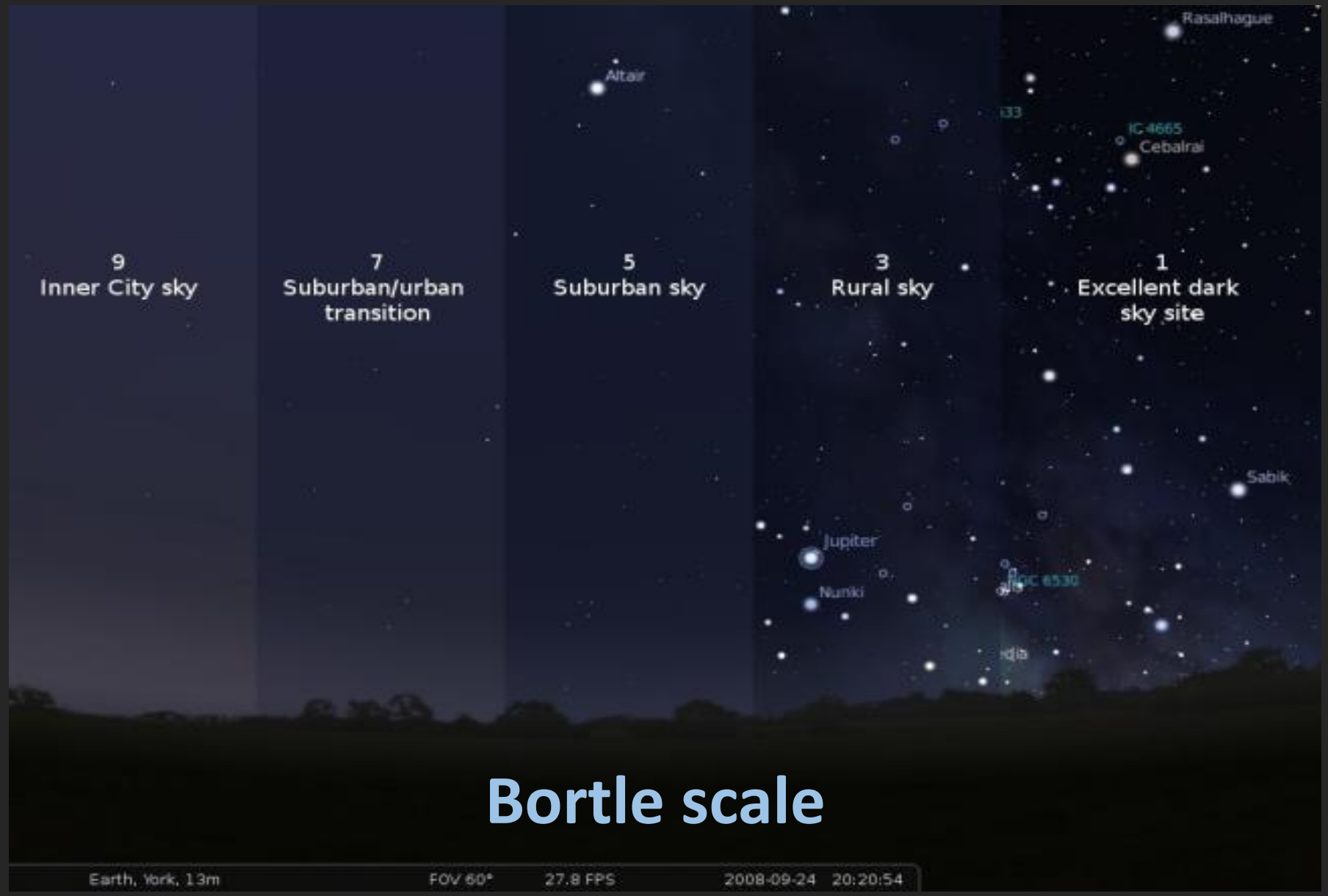
Willard Sharp Photography

Astrophotography

What is Nightscape Astrophotography?

Nightscape Astrophotography is a specialized type of photography for recording photos of astronomical objects and large areas of the night sky with a foreground subject.

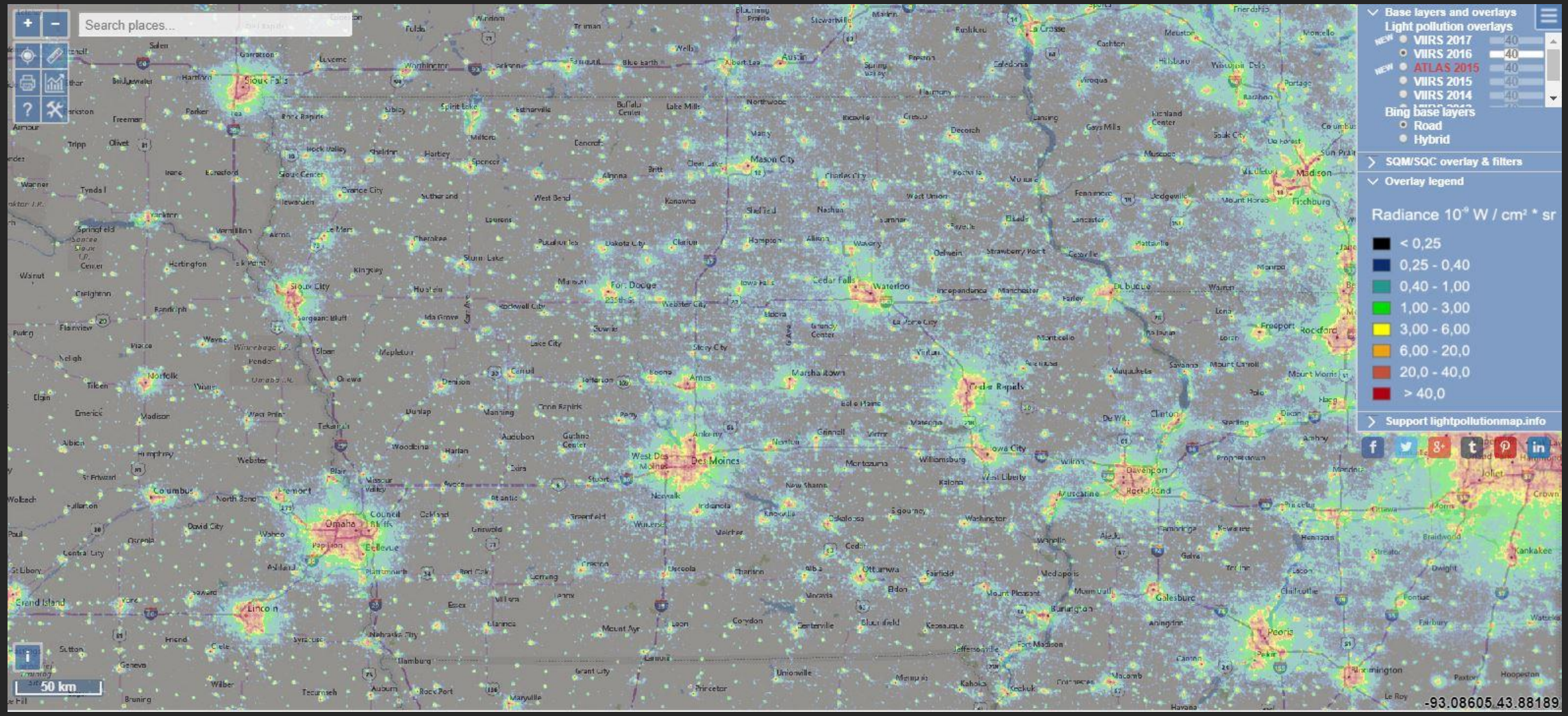
Planning & Scouting



Bortle scale

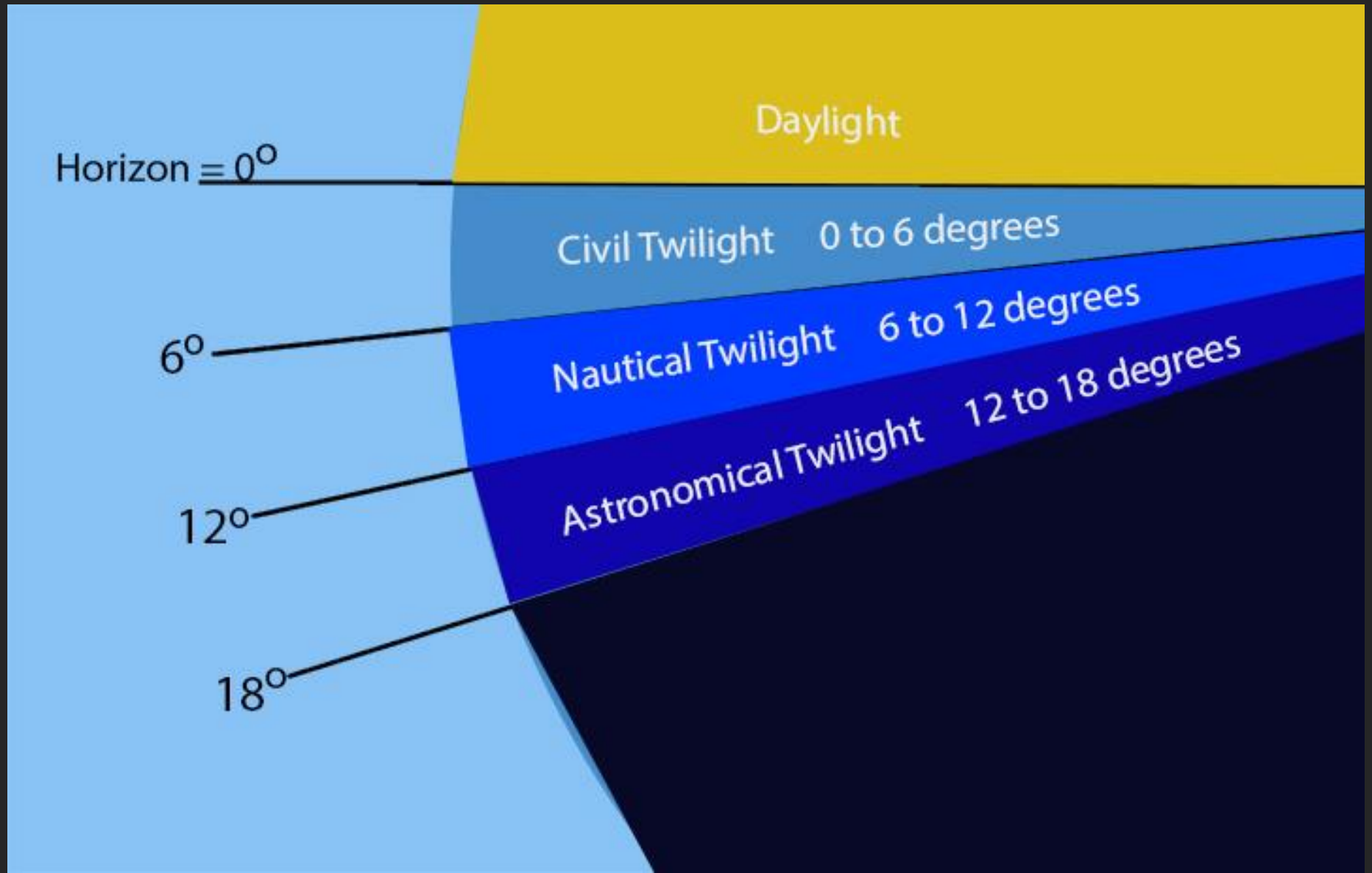
Planning & Scouting

www.lightpollutionmap.info



Planning & Scouting

Best time to photograph the starry night sky



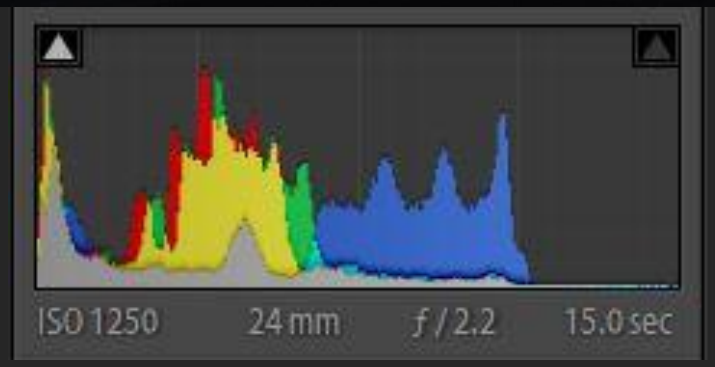
Planning & Scouting

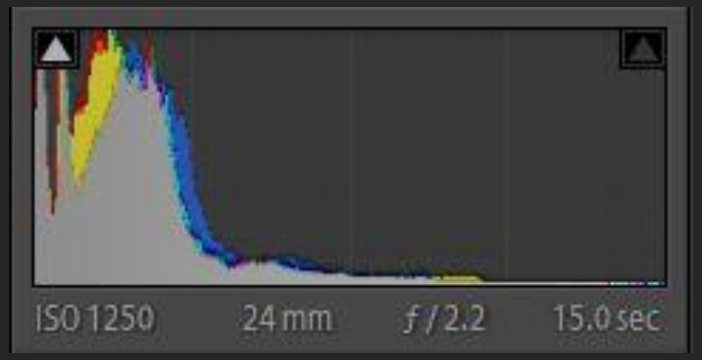
Best time to photograph the starry night sky

≈ 2 hours after sunset

≈ 2 hours before sunrise

Planning & Scouting





Don’t Forget to Plan for Moonlight

Don’t Forget to Plan for Moonlight

24mm, F/1.4, 15 sec, ISO 1250

Once you find the dark skies

- Polaris or the North Star is always to the north.
- Star trails can be done anytime of the year.
- Aurora are in the northern sky. Refer to space weather websites for aurora potential. They are sporadic here in Iowa. Spring & Fall are the best times.
- The Milky Way is in the southern sky from February to October.
  - In the early spring the Milky Way rises very early in the morning.
  - As we head into late spring and summer the Milky Way rises earlier so eventfully by the end of summer its rising before midnight
- Look for something interesting in the foreground to complement your astrophotography project.

Equipment

What Equipment Do You Need?

- DSLR Camera
- Tripod
- A fast lens F/2.8 or faster. **Rokinon, Samyang, Sigma** are best because they have the least amount of Coma.
- Stock lenses will work if the settings are correct.
- Wide angle. 8 to 35mm.
- Intervalometer or an interval timer in the camera for time lapse or star trails.
- Remote trigger
- Fully charged batteries.
- Flash lights
- Hand warmers for lens condensation.
- Dress for the weather!

Specialized gear for advanced astrophotography.

- Telescopes
- Equatorial Mounts
- Robotic Camera Mounts

Preparation

What is an intervalometer?

An intervalometer is a device that plugs into a camera and controls how often, how long and how many shots are taken. Models vary from manufacturer to manufacturer but they all serve the same purpose.

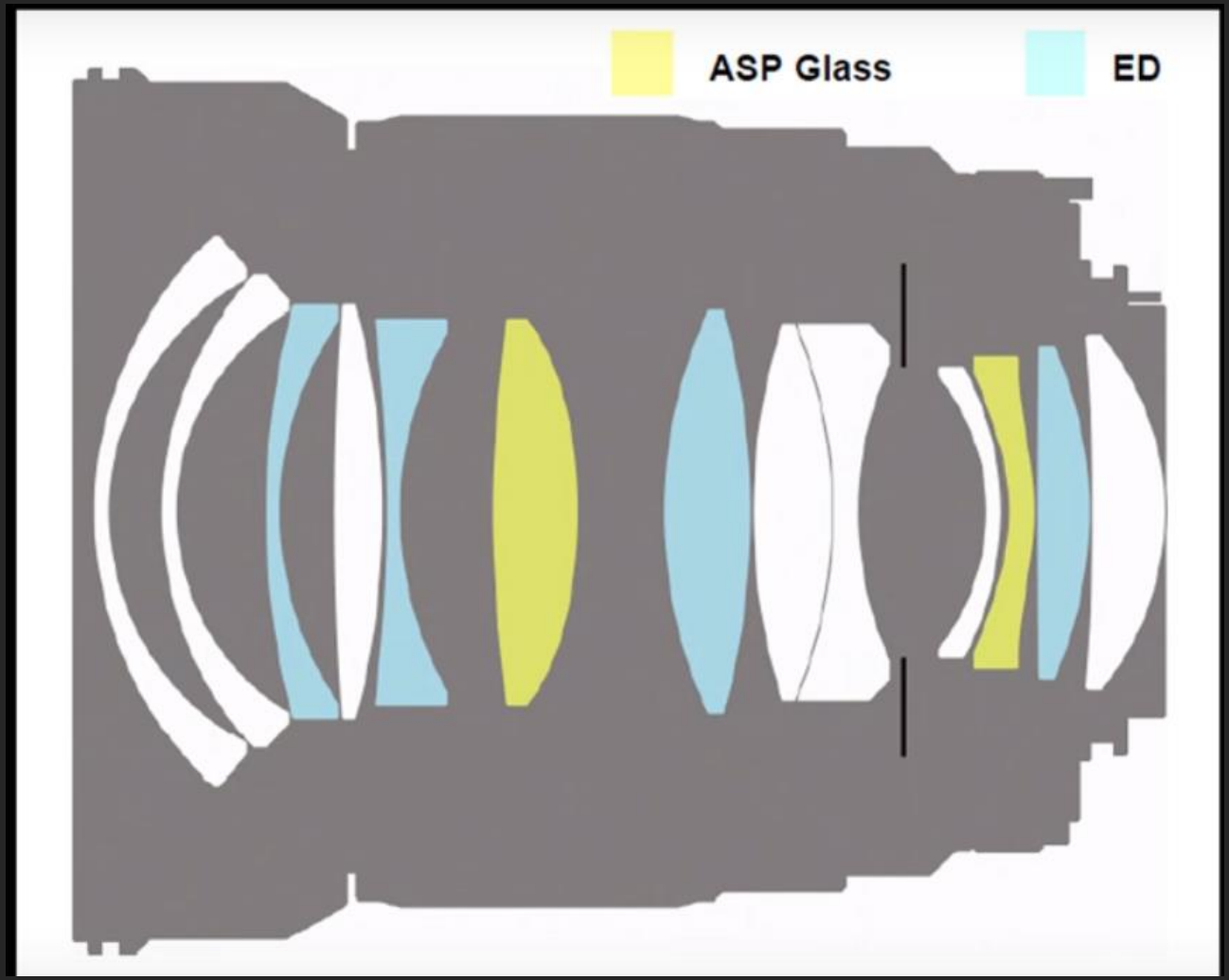
Preparation

Don’t have an intervalometer?

Equipment

The best budget astrophotography lens

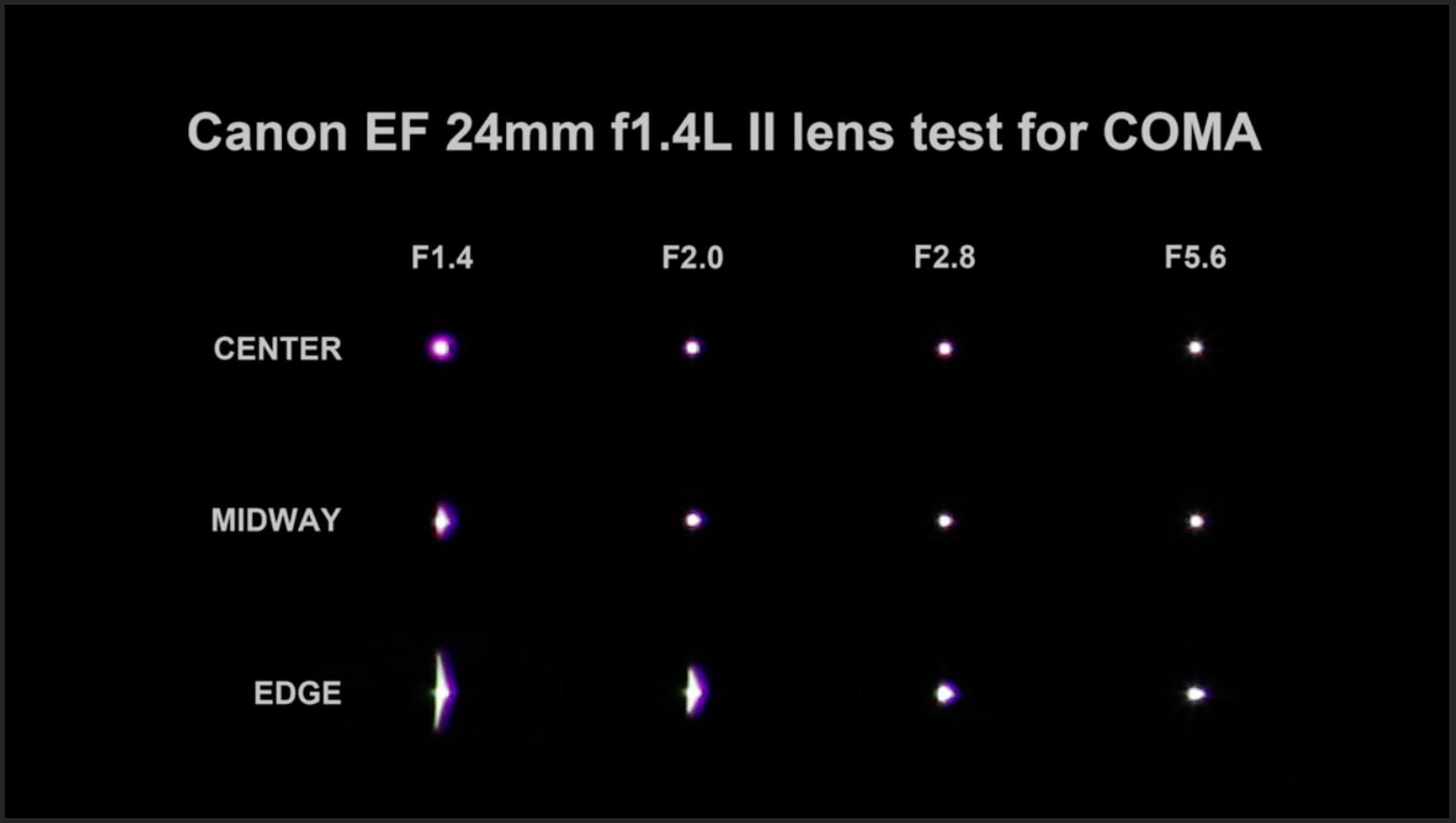
Equipment



These lenses have little is any coma or chromatic aberration

Coma

Coma


Canon EF 24mm f1.4L II lens test for COMA
F1.4
F2.0
F2.8
F5.6
CENTER
MIDWAY
EDGE

Focusing


The "Keystone" of NightScape Basics
Manual Focus
Canon
AF
MF
1.5
2.5
ft
0.5
1
∞
m
22 16 8 4 4 8 16 22
1:1.4 24mm
22 16 11 8 5.6 4 2.8 2 1.4
LCD Playback Screen enlarged 10X

Focusing

Tips

- If your camera has Live View magnify the screen to see the star and focus on that.
- If you don’t have Live View or an easy way to focus on the stars at night then set the focus during the day. Focus on a cloud or some other distant object such as a tree or power pole. The object must be at least 200 feet away.
- If you set the focus during the day use tape to hold the focus ring in place and place the lens in manual focus mode.

Camera Settings

Camera Settings – The 400 Rule

400 / lens focal length

SECONDS Before Stars Begin to Blur

Lens Focal Length	600 Rule Full-Frame	400 Rule Full-Frame	600 Rule APS-C crop*	400 Rule APS-C crop*
10mm	N/A	N/A	40	27
12mm	N/A	N/A	33	22
14mm	43	29	29	19
15mm†	45	30	27	18
16mm	38	25	25	17
17mm	35	24	24	16
18mm	33	22	22	15
20mm	30	20	20	13
24mm	25	17	17	11
28mm	21	14	14	10
30mm	20	13	13	9
35mm	17	11	11	8
40mm	15	10	10	7
50mm	12	8	8	5
70mm	9	6	6	4
85mm	7	5	5	3

Use BULB mode to achieve exact times

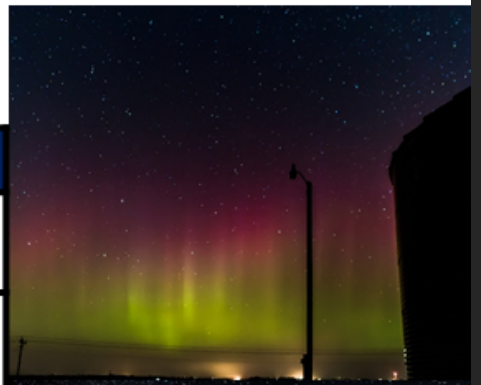
Camera Settings

Willard Sharp Photography's How To Guide

Basic DSLR Astrophotography Settings

	MOON	STAR TRAILS		MILKY WAY		AURORA
SHUTTER Exposure Length	1/100 TO 1/400 SEC	20 TO 30 Seconds or greater		**10-20mm** 20-30 SEC	**20-30mm** 13-20 SEC	5 to 13 Seconds
ISO	100-200	**URBAN** 400-800	**DARK SKY** 800-3200	**DARK SKY** 1600-6400		**DARK SKY** 1600-3200
APERTURE	F/8 – F/11	F/2.8 TO F/4		F/1.4 TO F/2.8 (Wide Open)		F/1.4 TO F/4

* The settings above are the recommended starting point settings on most DSLR cameras. Optimal settings will depend on location, sky conditions, and your goals for the photo shoot.



Essential Camera Settings

CAMERA: All camera settings to manual. Flash turned off. RAW mode for files.

LENS: Lens stabilization turned off. Autofocus off. Other than a clear lens filter remove all filters.

IN CAMERA NOISE REDUCTION
Set to off for star trails and Milky Way. Use post processing to eliminate noise and hot pixels.

WHITE BALANCE Will depend on your location. In light polluted areas set the white balance from 2900k to 3900k. In darker skies 3800k to 4300k. White balance can be adjusted in post processing as long as you're shooting RAW mode.

Web Resources & Apps
Light pollution maps - www.lightpollutionmap.info
Aurora Forecasts - www.solarham.net
PhotoPills Sky Guide
PlanIt!

Star Trails: Use an intervalometer with a remote shutter release locked on. Or use an interval timer with a 1 – 2 second delay between shots.

Milky Way: Use a remote trigger to take the shot. An interval timer can be used for time lapse shots but be sure to set the delay between shots to 2 seconds to minimize shake.

Aurora: They can be unpredictable so use the star trails method of shooting to capture them.

www.willardsharpphotography.com

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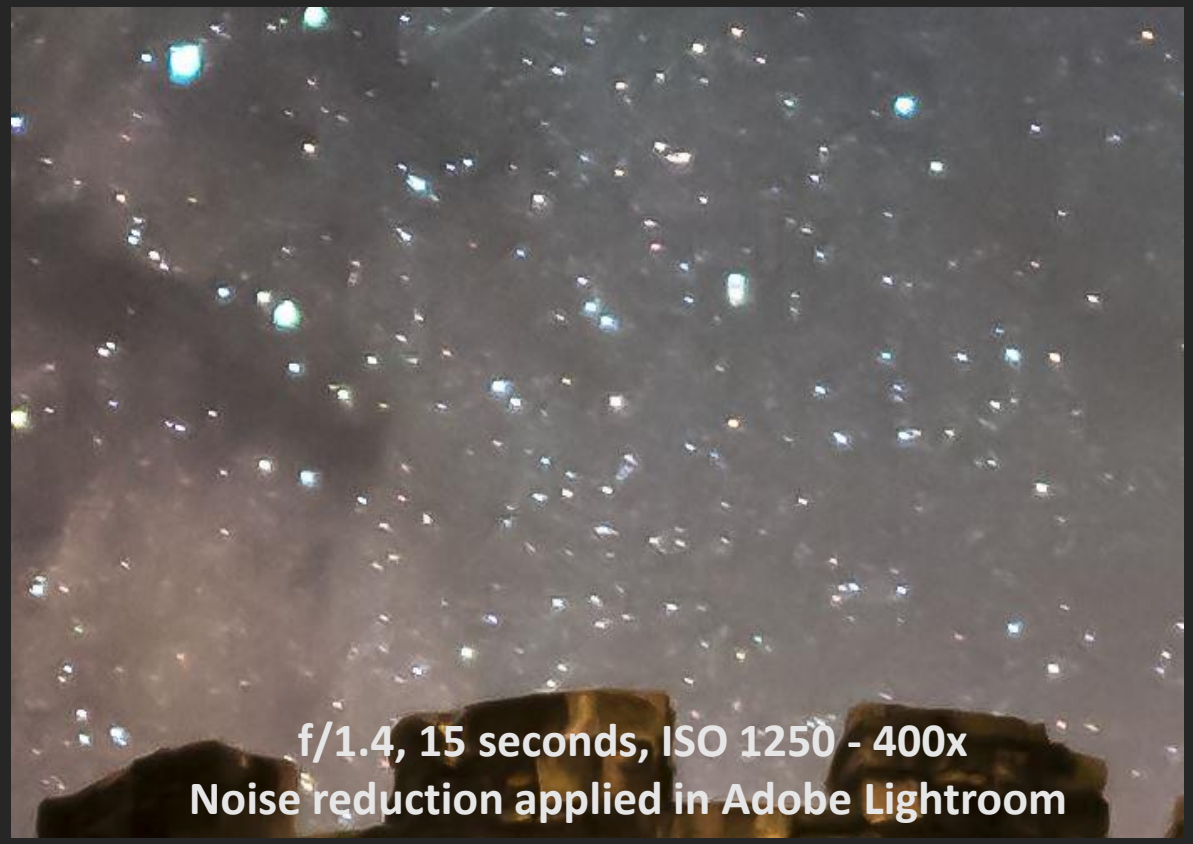
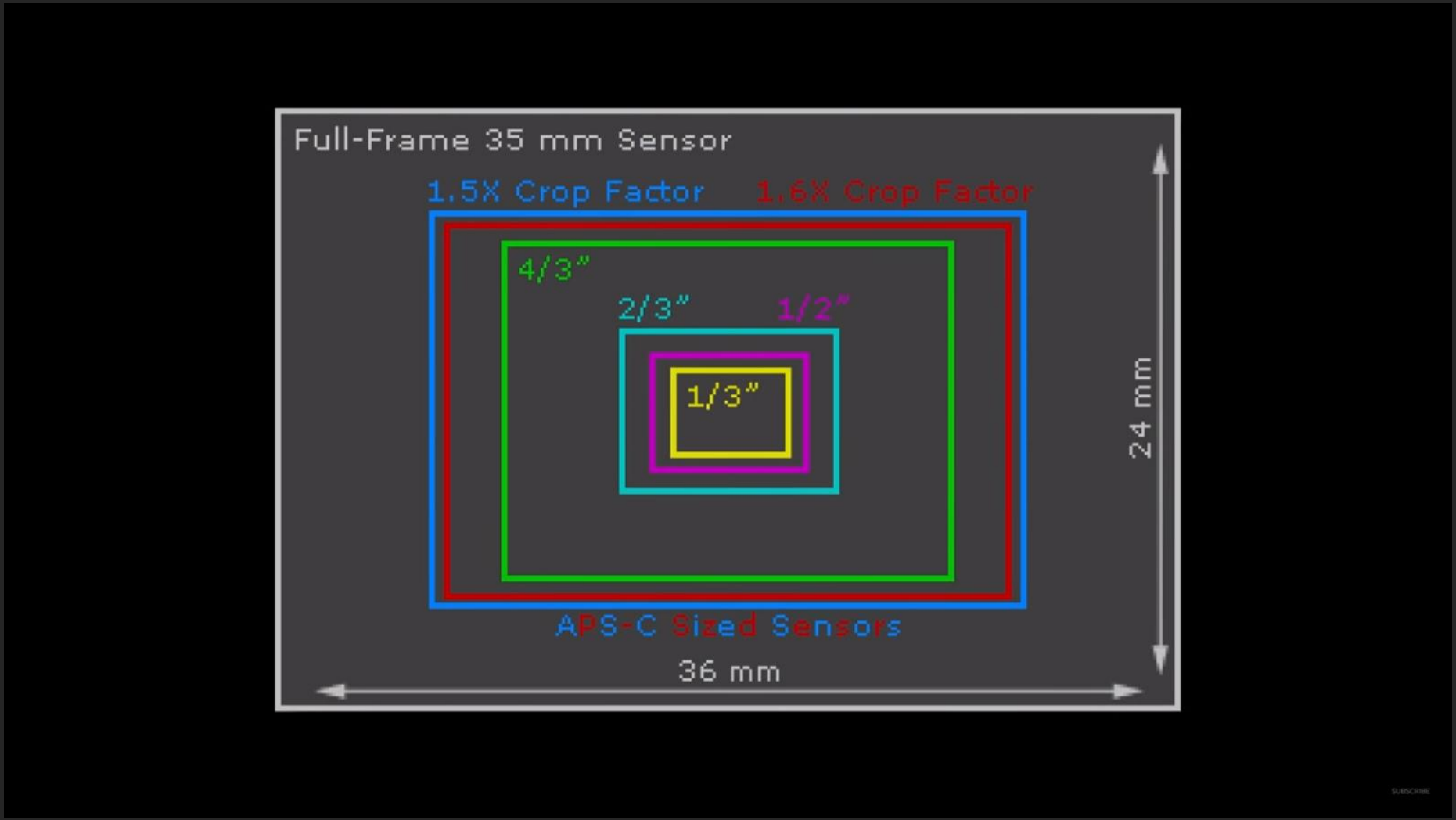
ISO & Noise

Increasing the ISO in the camera settings introduces noise.



- Noise reduction can be done using several methods.
  - Lightroom noise reduction dial
  - Stacking of multiple images
  - In camera multiple exposure stacking
  - Panorama stacking
  - Noise reduction masking in Photoshop

ISO & Noise



Full frame camera sensors handle noise and higher ISO better than the crop sensor camera.

You'll see less noise at colder temperatures.

My camera has a crop sensor and kit lens. Can I take photographs of the night sky?

My camera has a crop sensor and kit lens. Can I take photographs of the night sky?

With a kit lens you'll need to run longer shutter times and higher ISO to get photos of the Milky Way, star trails or aurora.

The Great Debate

I want to upgrade my hardware. Where do I start?

Camera Settings - Milky Way

MILKY WAY	
10-20mm 20-30 SEC	**20-30mm** 13-20 SEC
DARK SKY 1600-6400	
F/1.4 TO F/2.8 (Wide Open)	

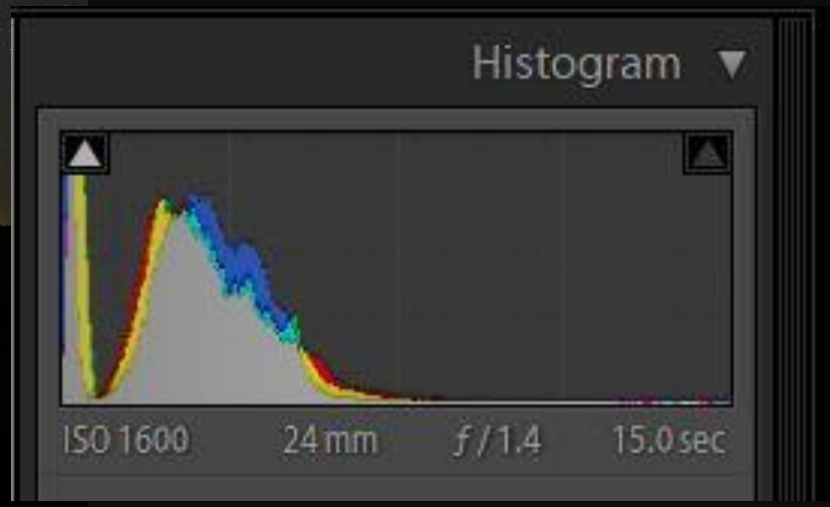
- Calculate your optimum exposure time using the 400 rule. Kit lens start at 30 seconds.
- In an area of dark skies set aperture wide open. F/2.8 or faster.
- Set your ISO to 1600 and adjust up or down depending on sky conditions and equipment.
- If you can set your white balance start at 3000 to 3400k in light polluted areas. Dark sky areas run 3800 to 4300k.
- Turn off all vibration controls on lens and camera.
- Manual focus
- Pixels matter! RAW for file format.
- **Secret tip** - If your doing individual Milky Way shots and not a time lapse or panorama turn **ON long exposure noise reduction**. If your doing the time lapse or panorama turn noise reduction off because the delay is to long. The stars move across the sky.
- Use a remote trigger or cable release. An interval timer can be used as well.

Camera Settings - Milky Way

MILKY WAY	
10-20mm 20-30 SEC	**20-30mm** 13-20 SEC
DARK SKY 1600-6400	
F/1.4 TO F/2.8 (Wide Open)	

- Don’t underexpose. Try to expose so the histogram is approximately half way across the scale.

Contrast & lens profile correction applied to this photo.



Camera Settings – Star Trails

STAR TRAILS	
20 TO 30 Seconds or greater	
URBAN 400-800	**DARK SKY** 800-3200
F/2.8 TO F/4	

- You'll need clear skies otherwise you'll have cloud trails!
- You want the stars to trail so go as long as you want with exposures. 20 to 30 seconds.
- Avoid bulb mode as this will heat the sensor resulting in noise and hot pixels.
- Aperture F/2.8 to F/4.
- Start with an ISO of 1600 and adjust up or down depending on sky conditions.
- If you can set your white balance start at 3000 to 3400k in light polluted areas. Dark sky areas run 3800 to 4300k.
- Turn off all vibration controls on lens and camera.
- Manual focus
- Turn off long exposure noise reduction.
- Use a continuous shooting method such as an intervalometer or interval timer to take the photos. No more than 1 or 2 seconds between shots.

Camera Settings – Aurora

AURORA
5 to 13 Seconds
DARK SKY 1600-3200
F/1.4 TO F/4

- The aurora moves across the sky so use shorter shutter times and higher ISO.
- Aperture F/1.4 to F/4.
- If you can set your white balance start at 3000 to 3400k in light polluted areas. Dark sky areas run 3800 to 4300k.
- Turn off all vibration controls on lens and camera.
- Manual focus
- Turn off long exposure noise reduction.
- Use a continuous shooting method such as an intervalometer or interval timer to take the photos. No more than 1 or 2 seconds between shots.

Camera Settings – Moon

MOON
1/100 TO 1/400 SEC
100-200
F/8 – F/11

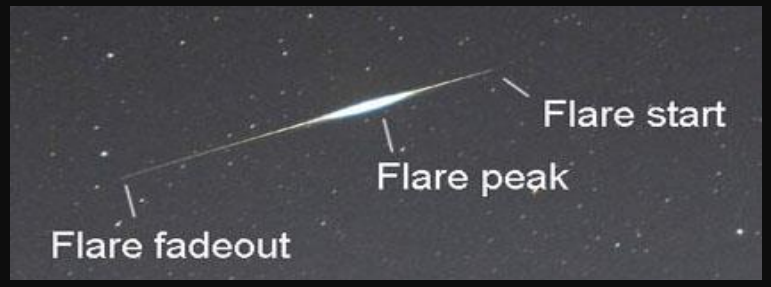
- The moon is much brighter than the stars. Keep the shutter time short.
- Keep the ISO low as the moon is bright.
- Aperture F/8 to F/11.
- A white balance of auto often works well for the moon.
- Turn off all vibration controls on lens and camera if shooting from the tripod.
- Manual focus. Auto focus will sometimes work if the focus dot is on the moon.

Things to Look Out For

Satellite

Airplane

Iridium Flare



Meteor

Things to Look Out For

Cars introducing light

Condensation

Light Painting

Light Painting

Summarizing the Planning Tools

Websites

- Light Pollution information - www.lightpollutionmap.info
- Google Maps – maps.google.com
- Weather & sky conditions - www.cleardarksky.com
- Weather - www.weather.gov/dmx/
- Weather www.madridiowaweather.com
- Space Weather - www.spaceweather.com
- Space Weather - www.solarham.net
- Computer software - stellarium.org
- StarStax web site - www.markus-enzweiler.de/software/software.html

SmartPhone Apps

- PhotoPills
- PlanIT
- Sky Guide

Contact Information

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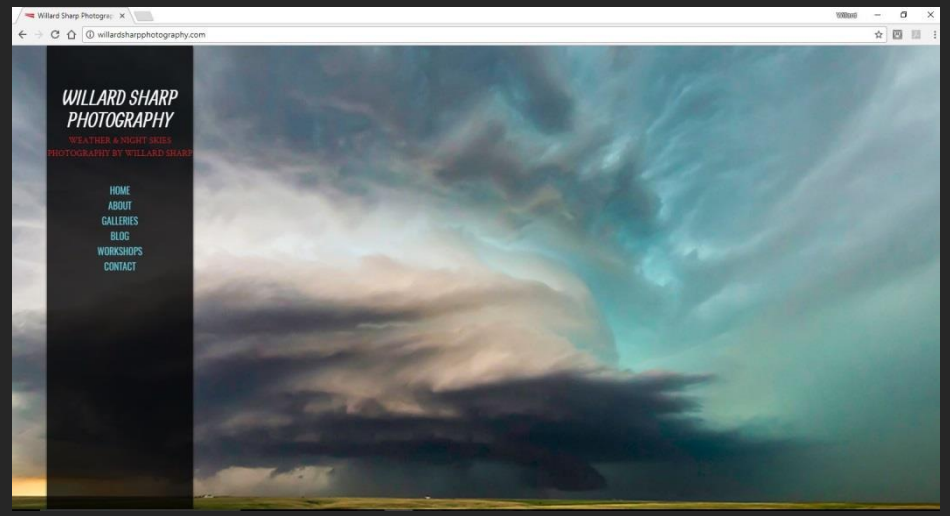
Photography Web Site – www.willardsharpphotography.com

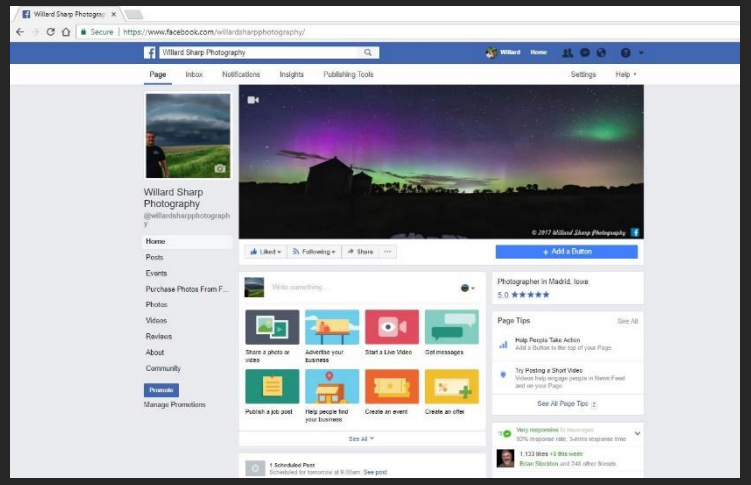
Facebook - @willardsharpphotography

Twitter - @madridiowawx

Instagram - @willardsharp

500px - http://500px.com/madridwx





Workshops in the Works for 2018!

Star trail photography and post processing – 2 days

Milky Way Photography – 1 or 2 days

Milky Way post processing – 1 or 2 days

Astrophotography Noise Reduction Techniques – 2 days

Iowa Night Skies – 3 to 4 days

Photographing Iowa's Stormy Weather – 1 or 2 days

Stay tuned to www.willardsharpphotography.com and social media for updates!