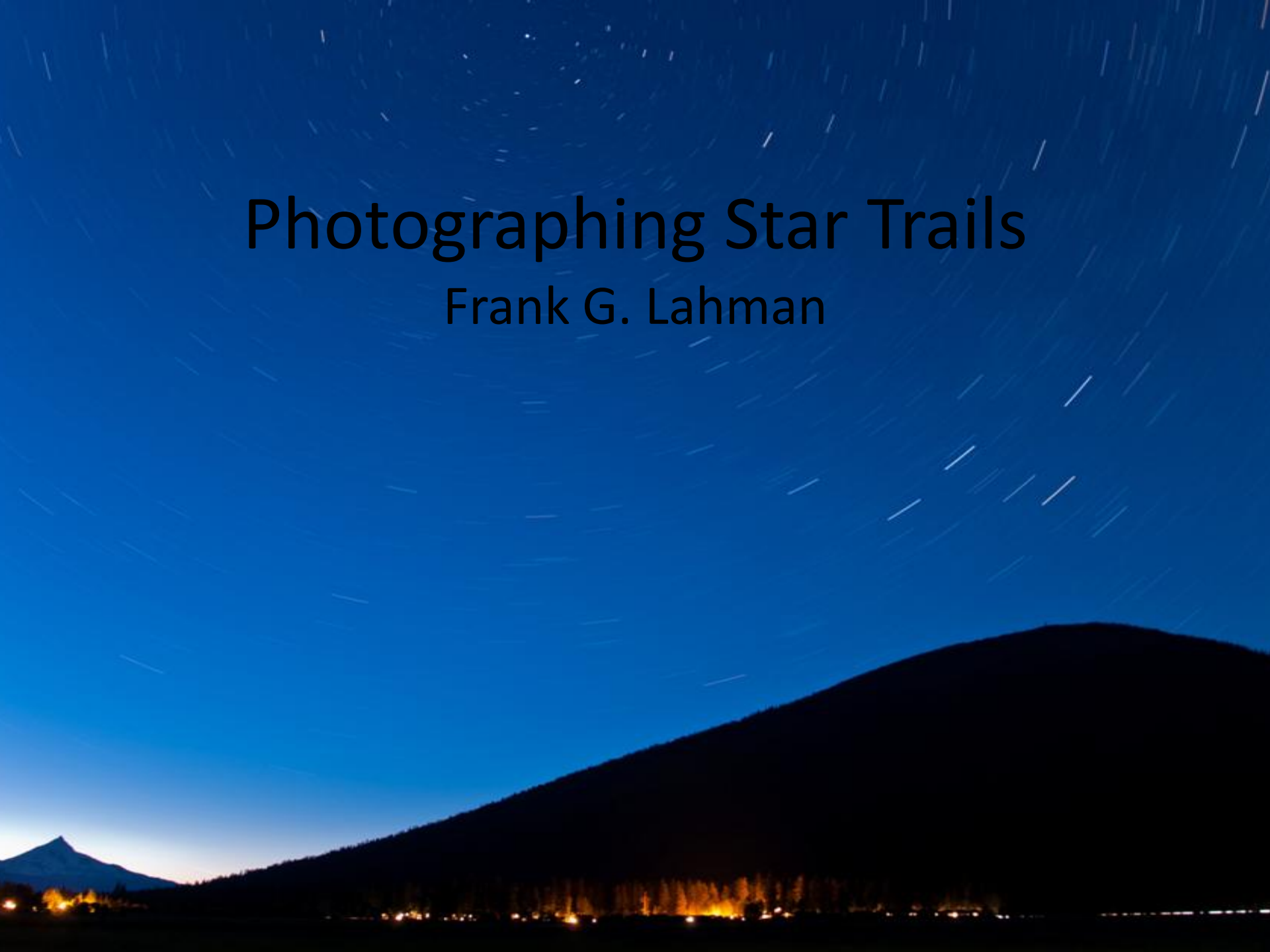


Photographing Star Trails

Frank G. Lahman



Equipment (essential)

- DSLR w/wide angle lens (~18-30mm)
- Cable Release or Cable Release w/Timer
- Tripod
- Fully charged battery + spare
- Lighting:
 - 200 lumens LED flashlight
 - Headlamp w/Red & White light

Equipment (recommended)

- Compass
- Cell phone/whistle
- Water
- Warm clothing
- Reflective tape on tripod leg(s)
- Reflective driveway stake
- Camp stool

More Equipment

- Boots (snakes, rocks, etc.)
- Trekking pole (without visual cues, balance is diminished)
- Shower cap (protect camera & lens from moisture)
- Lens Pen/microfiber cloth
- Sherpa, to carry all this stuff!

Procedure - Daytime

- Scout the location, using compass to locate North Star
- Take test shots w/camera to “pre-compose” the image
- Consider foreground
- If feasible, plant reflective stake at exact location for tripod

Questions

- Will there be moonlight or other light on foreground? Or, silhouette?
- One long exposure (w/foreground silhouette)
- or Stacked Images (lighted foreground)?
- Unwanted light sources (cars, streetlights, etc)
- Stars or foreground as main subject?
- Portrait or Landscape orientation?

Camera Settings

Single Long Exposure

- *Long Exposure Noise Reduction **ON**
 - + Cleaner background
 - + No gaps in trails
 - Doubles time of exposure
 - Undesirable light may intrude on image

Camera settings

Stacked Images

- *Long Exposure Noise Reduction **OFF**
 - + Half the time per image vs ON
 - + Allows an image segment to be deleted
 - + Less chance of noise if exposure < 5 min.
 - Requires expensive intervalometer
 - May have gaps between segments

Camera Settings-All

- RAW
- Image Stabilization **OFF**
- Aperture of f/2.8 to f/8 (start with f/4 to f/5.6)
- Native ISO (Canon=100, Nikon=200)
- Wide angle
- Manual focus on close half of infinity symbol
 - Hyperfocal or Live View if foreground illuminated

- Bulb shutter speed
- >15 min for single exposure
- 4-5 min for stacked images, > 8 images
- No filters
- Use lens hood
- If stacking, set interval at 1 second
 - (In intervalometer lingo a series of 4' exposures with 1" between each would have an *interval* setting of 4'1").

Illuminated Foreground

- If there is moonlight, streetlight, etc. on the foreground, do a high-ISO exposure test for foreground and set shutter speed & aperture accordingly. (See *Keimig*, p. 203)
- Native ISO 100: 1" at 6,400 = 1' at ISO 100
- Native ISO 200: 1" at 12,800 = 1' at ISO 200
 - If max ISO is 6400, 1" @6400= 1' @ 200 –one stop
- Stack images

Painting with Light

- To illuminate a silhouetted foreground, paint it with a flashlight.
- Whether doing a single long exposure or stacked exposures, try several test exposures just long enough to derive proper lighting w/flashlight. During the long exposure, paint with light for the proper time, anytime during the exposure.
- If stacking, paint during first and/or last image



Black Butte Ranch

ISO 200, 18mm, 14.25', f/5.6, LENR ON. Exposure reduced by 1.3 stops in Lightroom



Black Butte Ranch, ½ hour later

ISO 200, 18mm, 12', f/5.6, LENR OFF



Deschutes River, 1st of 8 stacked images

ISO 200, 18mm, 4', f/5.6, LENR OFF.

Exposed for moon-lighted foreground



Deschutes River, stack of 8 images @ 4' each



Don't forget to turn around!

ISO 200, 75mm, f/5.6, 47"



Moon Behind Rim-Deschutes River

ISO 200, 75mm, f/5.6, 116"



1st of 13, Bryce Canyon. Note insufficient paint
ISO 200, 18mm, f/5.6, 4'. ~30" of light from headlamp



Image # 2. No painting on 2-12.

ISO 200, 18mm, f/5.6, 4'



Image #13 with 3 ½ minutes of headlamp

ISO 200, 18mm, f/5.6, 4'



Queen's Garden-Bryce Canyon Stack of 13

Reference Sources

- ***Night Photography: Finding your way in the dark.*** Lance Keimig. Focal Press, 2010.
- ***Creative Night: Digital Photography Tips & Techniques.*** Harold Davis. Wiley, 2010.

Stacking Software

- Photoshop
- Dr. Brown's Stack-A-Matic
 - http://www.russellbrown.com/tips_tech.html
- Startrails.exe
 - <http://www.startrails.de/html/software.html>
- Keith's Image Stacker
 - <http://keithwiley.com/software/keithsimageStacker.shtml>
- Enfuse
 - LR/Enfuse: www.photographers-toolbox.com

Equipment Used for These Images

Nikon D300S w/Nikkor 18-200 lens

Manfrotto 055CXPRO3 tripod, Kirk ballhead & L-bracket

Nikon MC-36 Programmable Timer

Lightroom-3

Startrails stacking software (free)

Tovatec 200 lumens LED flashlight*

Black Diamond Storm headlamp*

*These items are replacing less effective light sources used for these images