IMPROVE YOUR NIGHT PHOTOGRAPHY

By Jim Harmer

SMASHWORDS EDITION

* * * * *

Improve Your Night Photography

THE SALES FROM THIS BOOK HELP TO SUPPORT THE AUTHOR AND HIS FAMILY. PLEASE CONSIDER GIVING THIS BOOK A 5-STAR REVIEW ON THE EBOOK STORE FROM WHICH IT WAS PURCHASED.

* * * * *

associated, or sponsored by the owners. The copyright notice and legal disclaimer at the end of this work is fully incorporated herein.

Smashwords Edition License Notes

This ebook is licensed for your personal enjoyment only. This ebook may not be re-sold or given away to other people. If you would like to share this book with another person, please purchase an additional copy for each person you share it with. If you're reading this book and did not purchase it, or it was not purchased for your use only, then you should return to Smashwords.com and purchase your own copy. Thank you for respecting the author's work.

* * * * *

Chapter Zero: A Brief Introduction

Dear Reader,

After teaching so many photographers the basics of night photography, I have learned that the same issues always cause frustration. This book is a collection of the most important fundamentals of night photography, so you can have success in this wonderful art form.

I began shooting night photography because I had a son, and didn't want to leave the family go shoot after coming home from work. Night photography allows me to go out after my family is asleep and take a while to enjoy myself. As you capture life in long exposures at high ISOs, remember the Creator of the beautiful scenes you record.

Regards,

Jim Harmer

* * * * *

Chapter One: Noise---Public Enemy Number One

The success or failure of your night photography will likely depend on whether or not you have fully mastered your low-light shooting technique. A skilled night photographer can leave a shoot knowing that all of her images were shot correctly to attain an image with very little noise in the image, while an untrained photographer will usually leave a night shoot with nothing but frustration if he has not mastered his low-light technique.

Any digital photographer knows that digital noise can be difficult to control in low-light situations, but what exactly causes noise?

Noise is like an audio cassette. When an audio cassette records a sound that is quiet, the listener often turns up the volume on the player to make the player more sensitive to the soft sound. When the listener does this, the player boosts the sound of the voice on the recording, but it also creates an undesirable fuzz that drowns out some of the voice on the recording. Just like audio cassettes, when a camera makes itself more sensitive to light by using a high ISO, unwanted fuzz enters the image. This fuzz, or digital noise, is created when stray electric signals on the camera sensor are interpreted as light.

The most common type of digital image noise that concerns photographers is called salt-and-pepper noise. This type of noise manifests itself with dark pixels appearing in light areas and light pixels appearing on dark regions of the photo. Dark regions of a photo show noise more plainly that lighter regions because the lightly colored noise sticks out on a dark background. This is of special concern to night photographers, because large portions of the image are often dark.

In addition to high ISO values, long shutter speeds also increase the amount of noise in an image. This is because the longer the image sensor attempts to collect the weak signal, the more stray electric signals it also collects. This creates a level of complexity for the night photographer, because it raises questions such as: "Will a 20 second shutter speed at ISO 200 produce more or less noise than a 10 second shutter speed at ISO 400?" This question is impossible to answer because it varies on every camera model. Cameras with better low-light performance will usually show less noise with a higher ISO value and shorter shutter speed, but other cameras will perform better with the opposite arrangement. Unfortunately, the best answer to this question is to come to know your own camera and how it performs.

You probably knew that high ISO values and long shutter speeds increase the amount of noise on the image before reading this book, but you may not know that these are not the only two factors which contribute to the amount of noise in an image. We'll also consider ambient heat, camera heat, and photosite size.

Heat is a form of electricity and cameras record the electric signals from heat just as they record electric signals from light. Therefore, warmer temperatures create more digital noise than colder temperatures if all other factors are equal. This is a consideration for photographers when shooting long exposures at night. When traveling, keep in mind that warmer climates will produce slightly more noise than colder climates, so you will need to change your shooting style.

Even the best-built DSLRs heat up as they are used. When long exposures are recorded, the camera must work for extended periods of time and will heat up quickly. To combat this problem, take breaks with the camera turned off between long exposures. If the lens can be removed momentarily without concern for dust entering the camera, this can cool down the camera quite quickly. While taking steps to cool the camera is usually not necessary, it can help to control noise in difficult shooting situations.

The last contributor to the amount of noise in an image is the photosites on the image sensor. You probably know that DSLRs produce less noise than point-and-shoots, but why? The sensor on a DSLR is larger. Just like a large umbrella touches more rain than a small umbrella, a large image sensor is able to collect more light than a smaller sensor. This light-gathering ability makes the light signal strong enough to differentiate it from the stray electric signals and results in less noise in the image. This is commonly referred to as the signal-to-noise ratio.

Suppose a DSLR and a point-and-shoot both have 14 megapixels. On the larger DSLR image sensor, the photosites (the tiny pixels on the sensor that record light) will be spread further apart than the same amount of pixels on the point-and-shoot. Since each photosite is further away from its neighbor, the stray electric signals produced by the neighboring photosite is less likely to affect the other photosite.

This is why a 35mm equivalent sensor (so-called "full frame sensor") will generally perform better in low-light than an APS-C size sensor with the same number of megapixels. The full frame sensor allows each photosite to be larger and further from neighboring photosites. This principle also explains why photographers generally push camera manufacturers to reduce the number of megapixels on a DSLR, because it allows for larger photosites and better low-light performance. Camera manufacturers have been slow to bend to photographer's demands in this area because so many novice photographers judge the quality of a camera by the number of megapixels.

The next chapter will discuss how to set-up your DSLR to minimize noise and maximize sharpness.

* * * * *

Quick Tip! Because night photographers seek to avoid having large pure black areas of a photo, choosing smaller subjects will generally result in better images than larger subjects. For example, shooting a landscape with large boulders in the foreground will result in large black shadows which can be distracting, but choosing tall grass as the foreground element will allow light to pass between the blades of tall grass and break up the dark foreground region of the photo.

The picture below is a good example of a controlled foreground with grass. The man with the umbrella is only a small portion of the image that is allowed to be almost pure black. Perfect exposure.

* * * * *

Chapter Two: Prepping the Camera

When shooting at night, many adjustments need to be made to the camera in order to obtain proper exposure, sharpness, focus, and color. Many of these settings are different than the settings that would be used during the daylight hours.

To mitigate the amount of noise in the image caused by long exposures, photographers can use long-exposure-noise-reduction on their camera. All modern DSLRs have this feature. When long exposure noise reduction is activated, cameras use a variety of methods to reduce the noise in the image. The most common method of in-camera long-exposure noise reduction is called dark-frame subtraction. Dark frame subtraction is a process whereby the camera takes two images. The first image will be recorded and uses the settings you select. The second image will be taken while the camera shows "Processing" on the black screen on your camera. This image

is not recorded and the photographer never actually sees it. The image is taken with the shutter closed so that no light is allowed onto the sensor. Because no light is let in, the image should be completely dark; however, some of the photosites will interpret stray electric signals as light and record them. This dark image with some stray pixels is then subtracted from the image taken by the photographer in an effort to reduce the noise on the image. The theory is that if there is a stray electric signal in the second image, it probably occurred in the first image, so subtracting it from the original image will produce a less-noisy photo. Keep in mind that dark-frame subtraction means that the second dark image will be recorded for just as long as the first, so extremely long exposures of fifteen minutes will take thirty minutes to take: fifteen minutes for the original exposure and then approximately fifteen more minutes for the dark frame subtraction.

While on the subject of stray light signals, it should also be mentioned that the optical viewfinder can send contaminating light onto the image sensor. When a photographer takes an image on a DSLR, the mirror flips up and blacks out the optical viewfinder (the part you look through to take an image) while the light from the lens is being recorded by the image sensor. In theory, the mirror blocks all of the light that could come through the optical viewfinder, but the mirror does not make a perfect seal and stray light can still enter around its edges. If you are a belt-and-suspenders type of person, it may be advisable to block out the optical viewfinder during a night exposure to ensure that no contaminating light enters through the optical viewfinder. This can be done by putting a piece of cloth over the back of the camera during an exposure, simply blocking the viewfinder with one's finger, or by using the viewfinder cover on some professional cameras like the Nikon D700 which has this feature.

Stray light enters not only from the rear of the camera, but the front of the lens. Lens hoods are used to prevent stray light from affecting an exposure during the day, but I commonly see night photographers make the mistake of removing the lens hood for night photography. These photographers erroneously reason that no light is strong enough at night to impact the image by reducing contrast or saturation. The opposite is true. At night when long exposures are used, cameras are more susceptible than ever of allowing stray light to affect the image. Lens flares, a reduction in contrast and color, as well as blur are the natural result for photographers who fail to use lens hoods at night.

Modern cameras record approximately 15 million pixels of information. Not surprisingly, even a brand new camera will often come with a few dead pixels. While this is usually not noticeable since one single pixel is relatively small, it can become somewhat of a nuisance when shooting night photography because dead pixels are usually recorded as bright pink spots and show up readily on a dark background. Dead pixels are less noticeable in digital stills than video on your DSLR. This is simply something to check for when purchasing a new camera. To check for dead pixels, shoot a dark background, then zoom in on the image to 100% and scan all over the image to look for dead pixels. If the camera you buy has many dead pixels and you're somewhat of a perfectionist, simply return the camera and buy a different copy of the same camera.

The sound that is made by a DSLR when taking a picture is made mostly from the mirror flipping up and down to allow the image sensor to access the light coming from the lens. Not only does the shutter flip cause audible noise, it vibrates the camera. This vibration is less concerning when shooting in the daytime because the shutter speed is usually fast enough that the mirror vibrations do not negatively impact image quality. At night, however, the long shutter speed will record every vibration of the mirror and cause blurriness in the photo. To remedy this, simply turn on mirror lock-up on your camera. When mirror lock-up is activated, the first time the shutter button is depressed, the mirror will flip, and the second time the shutter button is pressed, the shutter will release and the image will be recorded before the mirror flips back down. This mode is vital to achieving tack shark photos by night.

If you are a photographer who still shoots in JPEG rather than RAW, night photography will demand a change. Because exposure is so difficult to master at night, RAW allows photographers to maintain detail even with imperfect night exposures and will drastically increase how many "keeper" photos from a night shoot. For more on shooting in RAW, read the chapter on this topic from the first book in this series: "Improve Your Photography: How budding photographers can get pro results", which is available on all major e-book stores as well as Smashwords.com.

The last setting needed on the camera is manual exposure. Your camera's light meter, which is uses to determine proper exposure, is not sensitive enough to ascertain what shutter speed is necessary when shooting at night. Also, the exposure of night images is largely a creative determination, so the camera cannot make it for the photographer. DSLRs only allow up to

thirty second shutter speeds on manual exposure. To use shutter speeds longer than thirty seconds, simply purchase a cheap remote shutter release for your camera (see your manual for which models work with your DSLR). Most shutter releases cost approximately $15. A remote shutter release (also called a cable release) is simply a remote control for a DSLR. A shutter release is simply a remote control which connects to your camera and allows you to take a picture with the remote control so that you don't move the camera by pressing the on-camera shutter button. This is a must-have for night photographers. Another advantage to a shutter release is that it allows you to use your camera on bulb mode. Most cameras only allow the user to set the camera for exposures of up to 30 seconds. That's fine for almost all situations, but night photographers often take much more lengthy exposures than 30 seconds. On bulb mode, the shutter simply stays open and the sensor records until you tell it to stop by releasing the button on the cable release. You can set your camera to bulb mode by choosing manual or shutter priority (manual is superior for night photography) and simply scrolling to the longest shutter speed available. The last option will be bulb mode (Nikons will show just the letter "B", but Canons will read "Bulb").

The last change that needs to be made to the camera is not a camera setting at all, but something that needs to be done to the outside of the camera. Light can enter through the optical viewfinder of the camera. The optical viewfinder is the small window through which a photographer looks to compose the image. This light will enter the camera backwards, and can hurt the overall image. Photographers refer to this as a "light leak." To fix this problem, bring a small piece of cloth to set on top of the optical viewfinder to prevent this stray light from affecting the image during a long exposure.

* * * * *

Quick Tip! More than other types of photography, night photographers need fast memory cards. The long exposures required for night photography involve substantial work for the camera's image processor, so anything the photographer to do to speed up the process will help the camera to finish processing the picture. Choosing a fast memory card can be difficult because of all the marketing by the memory card manufacturers. The most reliable way to determine the quality of a memory card is to look at the class designation on the memory card. A class 10 memory card

guarantees that it can write data at a minimum of 10 megabytes per second. A class 6 memory card can write data at 6 megabytes per second. While these cards can achieve higher maximum write speeds, this number assures that the card will never lag behind a certain write speed.

* * * * *

Chapter Three: Painting with Light

More important than the subject of the photo is the light in the scene. Most of the time, the photographers can not do anything to control the light in the scene. Light painting is a method for photographers to control the light in the scene by using flashlights to paint light on the scene while the camera is capturing a long exposure.

Light painting is a fun photographic technique that can create visual interest in any night scene. It can best be explained by means of an example. Suppose you want to take a picture of a sports car at night in a downtown city area. The streetlights will put enough light on the roof of the car to expose it, but the interior of the car and the area under the car will be completely blocked from receiving light. Without light painting, the photographer will never be able to capture the detail in these areas.

To overcome this obstacle, a photographer can simply use a long exposure, set the camera on a tripod, and then use a flashlight to flash light onto the dark areas of the scene while the camera is still recording the exposure.

The best flashlight to use for light painting is a Mag-light or other brand of flashlight that has an adjustable beam size. If you do not have a Mag-light, cardboard or thick paper can be wrapped around the flashlight to control the beam.

The lens on the front of flashlights produces an uneven light beam. The uneven brightness of the flashlight's beam can produce unusually bright spots on the subject when the flashlight is used to paint the scene. Just as a painter would not want to use a brush that leaves spots and blotches on a painting, a light painter needs a flashlight that produces an even light. To do this, simply grab a piece of white tissue paper or wax paper to cover the front of the flashlight. This will even out the light produced by the flashlight.

The best way to learn light painting is by simply practicing it. However, becoming aware of this technique by reading this chapter will give you one more tool in your tool belt to capture more interesting night scenes.

* * * * *

Chapter Four: Shooting the Moon

Moonlight as Ambient Light

When shooting during the day, photographers pay close attention to the sun's position as it will affect the quality of the light on the subject. Similarly, night photographers must be keenly aware of the moon phase and position so as to obtain the best lighting in an image.

As the moon rises or sets and is low on the horizon, the light it emits will create long shadows that bring out the texture in objects. As the moon reaches its peak in the sky, the lighting is harsher and shadows are more shallow.

When long exposures of one minute or more are used, the moon will have changed positions during the shot. This movement softens the edges of light and creates a wider "gray zone." Imagine a light hitting a dark object. The center of the emitted light is bright, then there is a ring of gray light where it is neither completely lit nor completely dark. Then, outside the gray zone is the dark region where the light does not noticeably brighten the surface. Because the moon moves during long exposures, the width of the gray zone will widen because the light has physically moved.

The width of the gray zone is a factor to be considered when planning your night photos. Suppose you are shooting a cityscape with a cobblestone street at night. If a short shutter speed is used and ISO or aperture is changed to allow for more light, the shadows on the cobblestones will be harsher. The edges of the cobblestone will go from light to dark with only a thin gray zone. If a longer shutter speed is used and aperture and ISO are adjusted to achieve an equal exposure, then the gray zone will be much wider on the cobblestone and create softened edges on each of the bricks. Given these two options of a short or long shutter speed, this situation would probably lend itself to a shorter shutter speed that creates a thin gray zone. This will emphasize the edges on the bricks by creating a steeper transition from light to dark on each of the bricks.

Shooting the Moon as a Subject of an Image

Contrast of light is one of the most compelling aspects of many photos. Our eyes prefer to see objects with both highlights and shadows rather than evenly-lit scenes. At night, there is less contrast of light than during the day because the light sources are dimmer. To improve one's night photography, a photographer must consider how to increase contrast in every single image. The moon will always be the brightest natural light source in a scene, so including it in images will add contrast. Also, the moon always adds a serene mood to an image. Whether the moon is merely a part of a larger landscape or whether a photographer is shooting the moon as the main subject of an image, knowing how to shoot the moon properly can significantly increase the impact of a photograph.

The biggest mistake photographers make when shooting the moon is over-exposing it. The night may be dark, but the moon is actually quite bright. Generally, a shutter speed of approximately 1/320th of a second is necessary to properly expose the moon. Shooting the moon this quickly will allow for the craters and detail of the moon to be shown clearly. To bring out the detail in the moon, a significant amount of contrast and sharpness must be added in Photoshop or other digital image editing application

The moon waxes and wanes depending on the astrological conditions, but generally a photographer needs a 600mm lens on a crop-frame DSLR in order to fill the frame with the moon; however, because modern DSLRs have so many megapixels, photographers could easily use a 200 or 300mm lens and then use the computer to crop in on the moon.

While the moon is usually a pure white, it can appear to be other colors depending on astrological conditions. For example, a harvest moon often appears orange. To recreate the look of a harvest moon, a photographer can simply change the white balance on the camera to 7000 Kelvin. This will make the white moon appear to look like a moody orange harvest moon.

Including the Moon in a Larger Landscape

To obtain proper exposure of a landscape a long shutter speed and high ISO will be necessary to obtain enough light. By doing this, however, the moon will probably be overexposed in the image, and will not contain any detail. To overcome this obstacle, digital photographers who are comfortable using Photoshop or another digital image editing solution can create two images: one of the moon, and one of the landscape. With varied exposures in the two photographs, the moon with detail can be put in the properly exposed landscape and the photographer can have the best of both worlds.

While most photographers prefer the look of landscapes where the detail in the moon is maintained, other images lend themselves to allowing the detail in the sun to be clipped. This creates a large white spot in the photograph with rays coming out the sides of the large white spot. This is a creative choice for each photographer to make.

There are times when the moon does not behave as photographers wish it would. Night photographers often want to reposition the moon to a different place in the photograph without altering the composition of the foreground elements. The simple solution is to cut the moon out in Photoshop and paste it in the correct location. If the moon is not in the frame at all, find another image that you've taken of the moon and simply paste it in the frame.

Is it cheating to use Photoshop? No, not really. Photography is art just as painting is art. Think of your image as a canvass on which you can create beautiful scenes. Just as a painter is not forced to create real scenes, neither is a photographer. The fine art photographer's job is to create beautiful scenes through a variety of techniques. That deer wasn't really that close to the nature photographer's camera... a telephoto lens was used to give that impression. That sunset wasn't really that vivid... we used a different white balance to bring out the colors. That football player wasn't really frozen in mid-air... we used a fast shutter speed to freeze the action. Changing the location of a moon in Photoshop is really no different than these other

photographic techniques. Learning to master Photoshop is every bit as difficult as learning to master the other photographic techniques mentioned.

Okay, I'll get off my soap box.

* * * * *

Chapter Five: Avoiding the Pitfalls of Depth-of-Field at Night

The moon is approximately 380,000 miles away from the Earth, so what aperture should be used to shoot an image of the stars or the moon? If you answered this question f/22 or some other high aperture, then you're one of many photographers who don't fully understand depth-of-field.

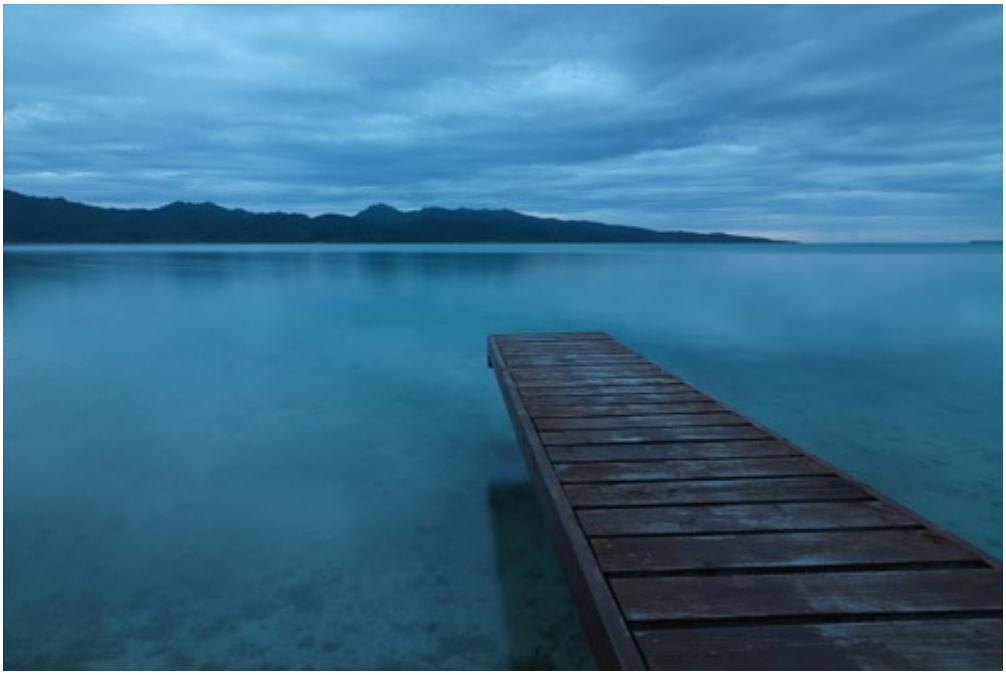
Lenses must physically move some of the elements (pieces of glass) in the lens in order to focus at different distances; however, every lens has a point where it is focused to infinity. This means that it no longer needs to move any elements whether you shoot at that distance or clear out in outer space.

If you are shooting the stars or moon, your lens will be focused to infinity. There is no depth-of-field concern whatsoever. Therefore, the only consideration in choosing an aperture is sharpness and the amount of light it allows to pass through the lens.

For shooting the moon, the best aperture is f/8 or f/11. Generally, these two apertures produce the sharpest results on most lenses. This added sharpness will bring out the detail in the moon's surface.

When shooting stars, it is usually necessary to choose a lower aperture so that the stars or star trails will be brighter. In this case, the lowest available aperture is probably the best option. Remember that the low aperture will work in this situation because depth-of-field is not a concern if there is nothing in the foreground of the image.

* * * * *



Chapter Six: Finding Focus

A technical problem arises for night photographers--autofocus ceases to work or ceases to work

as efficiently. Modern DSLR cameras use two methods to focus: phase detection and contrast assessment. A common myth among photographers is that phase detection does not require the camera to find contrast, but this is not true. In a sentence, the difference between the two methods is that contrast assessment uses the histogram of the camera to find maximum contrast as recorded on the camera sensor, and phase detection splits light rays and detects whether the light rays from the same light source are in phase with one another. Both of these methods work off the premise that an image is in focus when it has the highest possible contrast.

Look out into the night sky and you'll see nothing but black. On a bright night, you may see some traces of detail in a landscape, but very few. When a camera attempts to autofocus in a dark environment, it moves the focus ring on the lens to find maximum contrast, but because there is insufficient light,the camera will never register sufficient contrast to determine that the image is in focus. This leads to what photographers term "hunting." Hunting is when a lens repeatedly extends and retracts in an effort to find contrast, but never achieves focus. This phenomenon occurs not only during the night, but when a camera is pointed at any scene without enough contrast. For example, taking a picture of a plain white poster board will produce similar results.

Because autofocus is frequently inoperable at night, the solution is often to focus manually. Focusing manually is also difficult because it is cumbersome and because the optical viewfinder is often too dark to determine whether or not the image is in focus. Live view is often slightly brighter than the optical viewfinder, but usually still too dark to focus.

Newer model DSLRs have improved greatly in their ability to find focus in dark environments, but it remains an issue in many situations. One of the best ways to aid your camera in finding focus at night is to purchase fast lenses. Fast lenses are lenses with large maximum aperture values such as f/2.8 or lower. Most night photographers would never shoot a night landscape at f/2.8 because the depth-of-field would be too shallow; however, when the camera attempts to find focus, it does so with the largest aperture available on the camera. Only immediately before the shutter is released does the aperture spring into the size that the photographer has selected. This means that a fast aperture lens will focus more accurately and quickly than a slow lens. Consider this when choosing your next night lens.

The low-tech alternative to purchasing fast lenses or a new DSLR to find focus is to simply cast light on the scene. I always carry a flashlight and laser light with me when doing night photography. If I have difficulty focusing, which is often the case, I simply shine the flashlight to where I want to focus and then turn off the light before releasing the shutter. In many cases, the laser light is enough for the camera to find focus, so this is a good alternative when shooting in locations where it may disturb others if a flashlight is used.

If you are shooting astrophotography or landscape images without foreground elements, you'll want to focus to infinity (the furthest distance at which a lens can focus). There are several ways to focus to infinity. Some lens models make focusing to infinity easy by including a focus scale on the top of the lens near the base. If a focus scale is included, simply look for the mathematical symbol for infinity (looks like the letter eight turned sideways) and adjust the focus ring to hit the infinity symbol. Unfortunately, when digital cameras took over the world of film, lens manufacturers removed the focus scale from most lenses. Why did they do that? To drive night photographers crazy. Now, only higher-end lenses include a focus scale. If a focus scale is not included, you can get a good enough estimate of where infinity is by turning the lens to manual focus, putting the focus ring out as far as it can go, and then bringing the focus ring back in just SLIGHTLY from the furthest point. This is infinity.

While the aforementioned methods of finding infinity are necessary in dark situations, there is one very simple alternative if shooting when the moon is clearly visible. When a lens focuses on the moon, it will certainly be focused to infinity because of the distance between the Earth and Moon. Any camera will easily find focus when pointing at the moon. So simply point the camera to the moon, find focus by pressing the shutter button half way down, then lock the focus (you can cheat by flipping the switch on the lens or camera from autofocus to manual, or use the focus lock button on your DSLR), then re-compose the image to the composition you want, and fire!

* * * * *

Chapter Seven: Shooting Stars

Shooting stars in the night sky is one of the most popular subjects for night photographers; however, shooting stars is also quite difficult for beginning and intermediate photographers. Photographing stars raises problems of camera power, noise, exposure, weather, and post-processing. After learning to overcome these obstacles in this chapter, however, you will be able to capture gorgeous starry nights.

The first step to creating an image of the stars is to find a remote location for a shoot. Travel as far away from the city as possible. Any light coming from the ground will create light pollution and destroy the view of the stars at night. Shooting on a moonless night will also help to improve the brightness of the stars in the sky, because the light from the moon will not drown out the dim light created by the stars.

While photos of the stars are compelling enough alone, almost all photos of the stars will be enhanced by including some foreground and mid-ground elements in the image. This adds visual depth to the image and draws the viewer into the scene. What does this mean? When you go to take a shot of a beautiful scene, find something to put close to the camera and something far in the distance. When you're photographing a waterfall, consider putting something near the

camera: a flower, an interesting rock, a tree, etc. Then the photograph will have that foreground element, the ground leading to the waterfall as a mid-ground element, and the waterfall as a background element.

Because it is difficult to make a quality composition in the dark of night, it is advisable to arrive before dark and set up a composition and work on focus before it is dark enough to shoot.

After setting the composition and after it is dark enough for the stars to appear, test the composition by shooting a few sample images. These images will later be deleted, so turn off long-exposure noise reduction, use the highest ISO your camera has available, and use the aperture that you intend to use on the final composition. Shooting this test shot will allow you to assure that the image will be what you expect. Often a composition will look much different at night and shooting this test image will allow the photographer to avoid any mistakes before investing half an hour or more in shooting the final long-exposure only to recognize that the composition was not correct. Also, I often recognize in a test shot whether some part of the image will cast a deep shadow that I decide to fill in with a flashlight during the exposure.

Ideally, a high aperture value would be used to shoot stars when there are foreground elements of land included in the landscape. This would produce better depth-of-field; however, a high aperture will make the stars in the image too dark no matter what ISO or shutter speed is used. To overcome this problem, a photographer can either use a low aperture such as f/4 and hope that the foreground elements are not overly out-of-focus, or the photographer can take one image while focusing on the foreground and then a separate image for the stars and then blend the two images together using Photoshop.

At this point, the photographer must choose whether to shoot a shorter exposure and capture the stars as frozen points in the sky, or use a very long exposure to capture the movement of the stars as the Earth rotates.

Star Trails

Shooting star trails means using extremely long exposures to take an image of the stars as they move across the sky.

Every time I teach a class on shooting star trails, the same questions are always posed. The most common question is how to take an exposure so long that it shows the movement of the stars without noise. This is undoubtedly the most difficult aspect of night photography. There are two methods to solving this problem. First, the photographer can simply take whatever steps possible to mitigate noise and hope for the best. This usually works fine for shorter exposures of 10 minutes or less. For example, a photographer choosing this method might have settings such as aperture f/4, ISO 200 (100 is generally too dark to see the stars clearly), and a shutter speed of 10 minutes. This will produce acceptable results on some cameras that handle noise well, but the streak of the stars on a 10 minute exposure will be quite short.

The second method for shooting star trails involves more digital image editing, but generally produces much cleaner images with less noise. In this method, the photographer takes many images of short exposures, uploads the photos to the computer, and then brings the images into Photoshop or a dedicated program for processing star trails. The star trails program will put all of the images you took of the same scene while locked down on a tripod and stack them on top of each other in layers. Then, the program will analyze each pixel on the images in the stack and select the brightest pixel out of all the images. In the sky, the brightest pixel will always be the one that has the star and not the sky around it. The program will then display an image of the star trails.

So what is the best program to use for star trails? There are several, and the differences between them are usually minor. First of all, there are numerous Photoshop actions that accomplish the task of including only the star and not the sky of each image so that the stars will appear to be a long streak. A simple web search will reveal several free options.

There are also many dedicated programs (not Photoshop actions) which accomplish the same purpose. For the Windows platform, one of the most popular options is a program available at www.startrails.de. For Mac Users, you might try Kieth's Image Stacker. There are many other programs available online that accomplish the same purpose, but these are two of the most widely used programs.

When shooting star trails that will be used in a program to stack the exposures, you must change the way you shoot in order to achieve better results. First, turn of long-exposure noise reduction. While this setting is typically turned on to reduce the noise, it takes too long to process each

image. During the processing, the stars will move, thus creating spotty streaks with tiny spaces instead of a smooth star streak. I generally achieve the best results by shooting settings such as f/4, ISO 400, shutter speed 5". (Note: Cameras show quotation marks to indicate seconds on the back of the LCD. Thus, 3" means 3 seconds). With these settings, a picture will be taken approximately every 6 seconds. Each exposure will be taken for 5 seconds, then wait one second to let the camera reset its buffer, then shoot again. This process of shooting many images will be continued for as long of a star streak as is desired.

A star streak approximately 1 inch long on the resulting image will take about 20 minutes of shooting. For a more drastic long star streak, a total of 4 hours of shooting or more could be warranted. If an image is taken every 6 seconds for four hours, there will be 2400 digital images. This is unnecessary and no computer program could handle this amount of data easily. If very long streaks are desired, the only option is to take much longer exposures so fewer total images are required. This is not ideal, because the longer the exposure, the more noise; however, using a shutter speed of 1 minute and thirty seconds in the situation mentioned above will cut the total number of images from 2400 to only 160. While this number of images is still large, it is more manageable. To process this number of images, the best results are generally achieved by processing the images in sections. Process 25 images completely, then run the resulting images through mild noise reduction software, then process 25 more images and run noise reduction software. After all of the sections are processed, process the sections together into one image. Viola! It will appear that 4 hours of stars were captured in a single images with long smooth streaks.

The direction you face when shooting star trails will impact the look of the stars in the sky. If you face North, toward the star Polaris (also called the North Star), then the stars will streak in a full circle. If you face a different direction, it will not be possible to show a central point around which the stars rotate. If you have a smart phone, download the application called "Google Star Map", which shows a map of the stars as you point the phone at different stars. This will also point out constellations, planets, and more. The application is free, and a favorite among night photographers.

I already know what will happen when you try shooting star trails for the first time. Next weekend you'll head out to a dark place to take pictures of star trails. You'll arrive at your

location with perfect foreground elements and look up at the sky only to see clouds blocking your perfect starry sky. Fear not! Taking long exposures with clouds can produce dramatic images. The streak of the clouds gives an image a ominous and surreal look. You can get your star trails next week, but don't pack up just because it's cloudy.

Freezing the Stars in the Sky

Shooting the stars as non-moving white dots in the sky is much simpler than shooting star trails, but there are a few tricks that can improve your photography of star trails.

When shooting exposures of stars, one is tempted to use long shutter speeds to capture the dim light that stars produce; however, remember that the stars are gradually moving across the sky. If a shutter speed of more than 15 seconds is used, the stars will appear oblong rather than circular because the star will have moved slightly during the exposure.

To combat the short shutter speeds required for freezing the movement of stars, higher ISOs and low apertures are required. Remember that the aperture will not affect the depth-of-field in the image of the stars unless something in the foreground is captured in the image, because the stars will always be focused at infinity. If a foreground element is used, the best results are attained by shooting one image focusing on the foreground, and a separate exposure focused to infinity to capture the stars.

Using newer model cameras with good low-light performance, incredible detail can be captured in the night sky. In rural areas where light pollution does not destroy the view of the sky, even the Milky Way will be easily visible.

* * * * *

Quick Tip! Nothing ruins a star trails shoot quite like low battery. Remember that your camera will be working on shooting and processing images for hours, so the battery will drain quickly. To help alleviate this problem, charge your battery immediately before shooting and don't use the LCD screen. In the menus in your camera, you'll see how to turn off the LCD. This also

means not using live view, as that drains battery quickly. If price is less of an issue, purchasing a battery grip and extra batteries for your camera will extend the battery life.

* * * * *

Chapter Eight: Exposing the Night

Without a doubt, the most common mistake made by beginning night photographers is not achieving a bright enough exposure. There are several causes of this common error, and as you familiarize yourself with these pitfalls, you will be more likely to overcome them.

If you want to capture an image that will “wow” viewers, you must not waste any space in your image. Too many night photographers allow large portions of the image to stay pure black. While creative empty space can be a valuable tool for compositions, leaving large areas of a

night photo black usually looks like a mistake rather than a creative choice. The night is already black, so photographers must brighten the darkness rather than leave it black.

The reason that photographers fail to choose a bright enough image is because of the LCD screens on the back of the camera. LCD screens are not capable of rendering a pure black pixel, so the dark regions of the image will always appear to be brighter on the back of the camera than they really are. Also, the overall image will look brighter on the camera's LCD than it really is, because it is being viewed with blackness around it. The same principle is true when watching TV in your living room. The picture on the screen always seems brighter when the room is dark than when the lights are on.

For these reasons, the LCD on the back of the camera is the least reliable indicator of correct exposure when shooting night photography. The only proper indicator of proper exposure is the camera's histogram. All DSLR cameras can display a histogram of the exposure of your image. When you take pictures and want to see if you have over-exposed the image, check to see if any portion of the image touches the far right of the histogram. If it does, then detail has been lost in the highlights. A histogram touching the left side of the image shows that shadows were clipped. When shooting night photos in which the light source is in the image (the moon, a street light, etc), there will usually be slightly clipped highlights. Generally, this will not detract from the image as long as the highlight clipping is not too severe. When shooting night photography, the more important question is whether the dark areas of the image are clipped. Almost always, there will be some shadow clipping, but be careful that there is not too much of a spike on the left side, as this is a sign that the image is underexposed.

When shooting a night image that will later be made black-and-white in Photoshop, it is even more important to reduce the amount of shadow clipping in the image. When shooting for black-and-white, color cannot be used as a crutch to cover up mistakes in exposure. Furthermore, any significant region of the image which is pure black will destroy the overall look of the shot. Capturing a brighter image will allow you to use more contrast in Photoshop to create a punchier black-and-white.

Because of the aforementioned difficulties in exposing a photograph at night, the camera's meter cannot be relied upon. Therefore, you must always use manual exposure when photographing

night scenes. Aperture priority may be a useful option for shooting during the day, but it will not produce consistent results for shooting at night.

Suppose you are shooting a lake, the ocean, or a building at night. These surfaces will all reflect the light in the sky, the street lights, and the moon. It will be difficult to expose both the street light and the light reflecting off the building. The trick to overcome this difficulty is to simply expose for the reflection rather than the light source. This will keep the most important area of the photo, the reflection, properly exposed. The highlight details can be recovered later if the photographer shoots in RAW, or they can be captured in another exposure and blended in Photoshop. Exposing for the reflection rather than the light source will keep you from creating too dark of an image.

No matter what you do, there will be times when it is impossible to capture both the brightest highlights in the sky and also the dark shadows on the landscape. Somehow, the photographer must find a way to darken the sky and brighten the land on the bottom of the image. To accomplish this, the best tool is the graduated neutral density filter.

If you have ever seen the windshield of a car, you have seen a graduated neutral density filter. A grad ND filter, as it is called, is tinting on the top of a lens that gradually fades to clear at the bottom of the lens. In photography, a graduated neutral density filter is put in front of the camera lens and placed so the dark tinting darkens the sky, and the land on the bottom of the image is left untouched by the clear portion of the lens.

Grad ND filters come in several varieties. The most common is a type which screws onto the front of the lens much like a polarizing filter or a UV filter; however, this type of filter is generally not the best type of grad ND filter because it does not allow the photographer to control where the dark part is and where the clear part is. The best type of grad ND filter is a flat rectangular piece of glass that is simply hand-held or put on a holder in front of the lens, but does not screw onto the lens. With this type, the photographer can lift or lower the filter so it matches the horizon of the image.

* * * * *

Chapter Nine: Getting Sharp Shots at Night

When shooting portraits of people, a little bit of blurriness on the skin is usually preferred. Most people don't like to see tiny imperfections and roughness on human skin in a photo; however, because night photos are always taken in dark situations whatever detail can be captured is essential to creating a captivating scene.

Sharpness is a term that photographers throw around without a second thought. Generally, sharpness is discussed in relation to lens selection because it is the lens that determines what the camera is capable of recording under perfect conditions. However, while the quality of the lens will impact the sharpness of an image, the most important factor involved in creating a sharp image is the photographer's technique in shooting the image. Let's understand proper technique and then dissect the nitty gritty scientific stuff about the lens itself.

When cameras and lenses are produced in factories, the manufacturers test them to ensure that they are within certain tolerances. Some lenses may have an element group set half a millimeter further to the front than other lenses of the same model. Some cameras may have a sensor that is placed 1 millimeter further back in the camera than another. Other cameras may have a lens mount that is slightly twisted. Quality manufacturers analyze their products for these variations in each camera and lens, but it simply is not possible to ensure perfect uniformity. As long as the

camera or lens falls within a certain tolerance range so as to ensure that it is not completely defective, it is shipped to the consumer. Photographers often talk about a bad “copy” of a lens or a bad “copy” of a camera. They mean that the particular product they received did not perform as well as most products of the same make and model.

Some lenses may perform well on some cameras and poorly on others, so it is impossible to tell if a camera or lens is a bad copy by testing it on only one camera or with only one copy of a lens. When purchasing a telephoto lens, it is important to test the lens on your camera. Check for sharpness and see if the copy of the lens you’ve received produces sharp images with the copy of the camera you own. Higher-end DSLRs have a feature called “Lens Micro-adjustment.” This feature will train the camera how to adjust itself to match the lens and overcome some of the minor variations in lens models.

Another consideration is the sharpness of lenses at varying focal lengths. Every zoom lens will be sharper at some focal lengths than others. Almost universally, the shortest focal length and the longest focal length of a zoom lens will be softer than somewhere in the middle of the zoom range. When testing lenses and considering what focal length should be used to shoot an animal, keep this fact in mind.

Having established that each copy of a lens may work differently on specific copies of cameras, and that lenses are sharper at some focal lengths than others, I hesitantly present one more factor that impacts the sharpness of a lens. All lenses are sharper at some aperture values than at others. Most lenses are sharpest at either f/8 or f/11 as it is in the middle of the aperture values that the camera is capable of using. When at all possible, use these aperture value and the overall sharpness of the image will drastically improve. Even cheap lenses are sharper at medium focal lengths than even the most expensive lenses at their maximum apertures.

All right, but what exactly is sharpness? Sharpness is a term used to describe a lens’s ability to resolve edges and reproduce fine detail. The scientific terms are acutance and microcontrast.

Acutance is the ability of a lens to show fine edges without any blur along the edge. Sharp lenses will show hard lines without any bleeding of the line onto the space next to it.

Microcontrast is the ability of a lens to show the finest details in an image. It is the measure of how fine of a point it can reproduce. Our eyes are subject to less-than-perfect microcontrast just

like lenses are. For example, if you were to bunch together thousands of sewing needles and look at the needle end of the bunch, you would be able to see each individual needle when up close to the bunch. However, if you were to step several feet away, you would only see the bunch as a whole. It would look like one big grey piece of metal instead of thousands of tiny needle heads.

More than any other type of photography, night photographers should pay the closest attention to sharpness. To increase the sharpness of your images, start with your lens technique. Go through each step you take when shooting and consider how you could maximize the stability of your camera. Then, consider your lenses and whether a sharper lens, or a better copy of the sharp lens, is needed.

* * * * *

Quick Tip! At night, you might find that you like a different white balance than you would like during the day. After your night shoot, consider playing around with the white balance in Photoshop (Adobe Camera Raw). Many night photographers use a tungsten (blue) white balance to achieve a unique look for the image.

* * * * *

Chapter Ten: Quick Tips for Shooting Fireworks at Night

Few things are more fun to photograph than fireworks, which is probably why it is the most commonly photographed night scene. Most photographers never venture out into the world of night photography, but anyone who owns a camera has shot pictures of fireworks at some point in their life.. For that very reason, you might think that it's all been done before; however, in this chapter you'll learn creative ways to make your night images of fireworks more compelling.

Tip #1: Don't shoot the fireworks. Shoot people watching fireworks with the glow of the colorful lights on their faces and the tiny fireworks in the background. The light from the fireworks

creates a beautiful mood on the people and will remind you of the outing and your family and friends who were with you.

Tip #2: Find something reflective and use it to show the reflection of the fireworks on the water, on the windows of a skyscraper, on someone's sunglasses, etc. Remember, objects show clearer reflections when you are closer to the same plane as the reflective surface. For example, taking a photo down low close to the water will show a brighter reflection than taking the same photo standing high above the water. Get as close to the angle of the plane of the reflective surface as possible for maximum reflectivity.

Tip #3: Choose a longer exposure. Fireworks are beautiful because of the anticipation of seeing them explode. A long exposure will show the streak of the firework shooting up as well as the colorful explosion all in the same frame. This makes more of a story. It usually takes approximately 7 seconds for a firework to shoot up, explode, and entirely dissipate, so set your shutter speed accordingly if you only want one burst in the frame.

Tip #4: Don't skimp too much on your ISO. While you want to choose a low ISO to mitigate the noise in the image, you want to use as high of an ISO as you dare in order to make the light bursts of the fireworks a bit brighter.

Tip #5: Just because you have beautiful fireworks as a subject doesn't mean you can throw composition out the window. Almost all landscape photographs look best with something in the foreground, something in the mid-ground, and something in the background. For example, you could photograph someone sitting on the grass with the glow of the fireworks lights on them, with the lake in front of you, and the fireworks in the background. Following this compositional tip will give the viewer a sense of place--like he or she is really there.

Tip #6: If you throw tip #5 out the window and don't have anything in the foreground, you can use extremely low aperture values to get the maximum amount of light on the camera sensor and increase the brightness of the firework bursts. When you focus on a point far enough away from you, depth of field is set to infinity and it really doesn't matter what your aperture is (except for sharpness).

Tip #7: Don't forget to set up shooting up-wind. If you sit downwind of the fireworks, the smoke will block your view after a while and you'll have hazy shots.

Tip #8: If you want to take a photo of multiple firework bursts in the same shot, but keeping the shutter open too long makes the landscape too bright, you can bring a piece of black paper with you. Put it in front of the lens hood and block all of the light between bursts of fireworks. Because the piece of paper is black, it won't be seen in the photograph since no light is recorded on the sensor when it sees pure black.

Tip #9: Many people are unsure of exposure settings for fireworks. There's no "right" answer because conditions vary so much, but I'll give you a recipe for a beautiful shot in many conditions: f/16, 15 second shutter speed, ISO 200. If you use those settings on a reasonably dark night and during an average-paced part of the show (the finale usually has so many fireworks that you have to use a slower shutter speed or you have way too much light), you'll get great results. Remember to put something--anything--in the foreground to make use of the increased depth-of-field from the high aperture.

* * * * *

Chapter Eleven: Choosing a Tripod for Night Photography

The importance of a tripod varies depending on the type of photography you do. Wedding photographers often don't use tripods when they can help it because they like the flexibility of walking around and taking pictures from different angles very quickly; however, night photographers, would not step foot into the field without a tripod. Let me explain why...

When a fast shutter speed is used, the importance of a tripod is lessened somewhat because there is less time for the camera to move during the exposure. If you're on the beach on a sunny day and using a shutter speed of 1/8000th of a second with a reasonably short lens, then the use of a tripod will show little or no difference in the photograph; however, if you're shooting at nightwhen the light is dim, or if a longer lens is used, the use of a tripod will make a tremendous difference in the sharpness of the overall image.

Utilizing a tripod is probably the easiest thing you can do to quickly--and noticeably —improve the quality of your night images. If your reaction to that statement was to head-out to Walmart, think again. Pro photographers would generally prefer going cheap on a camera body to going cheap on a tripod. Amateur tripods simply don't provide enough stability to achieve a sharp image.

Professional tripods have two basic parts: legs and a head. The legs are the large part of the tripod and the head is the mount which holds the camera body. Professional tripod legs are generally made of carbon fiber, which is more expensive but much lighter, and aluminum, which is heavier and more prone to perpetuating vibration. Heads come in many varieties, but most professionals prefer ball heads. The key to a good ball head is quick adjustments and rock-hard stabilization once locked into place. Cheap ball heads will slowly slide down if a heavier camera is placed on it because it cannot hold the weight. The bad news is that a decent tripod and head will cost about $300--and that's just for the bare minimum that a professional would use. Many tripods cost far more than this. You'll be tempted to buy a cheap $50 tripod, but you know what they say: "Buy right, buy once."

So which tripod should you buy? After reviewing literally dozens of tripods, I can confidently say that the brand I prefer is Induro. Really Right Stuff also makes very good equipment, but is more expensive. Manfrotto is one of the most popular brands of tripod/ballhead, but in my opinion, only about half of their gear is of a quality that I can recommend.

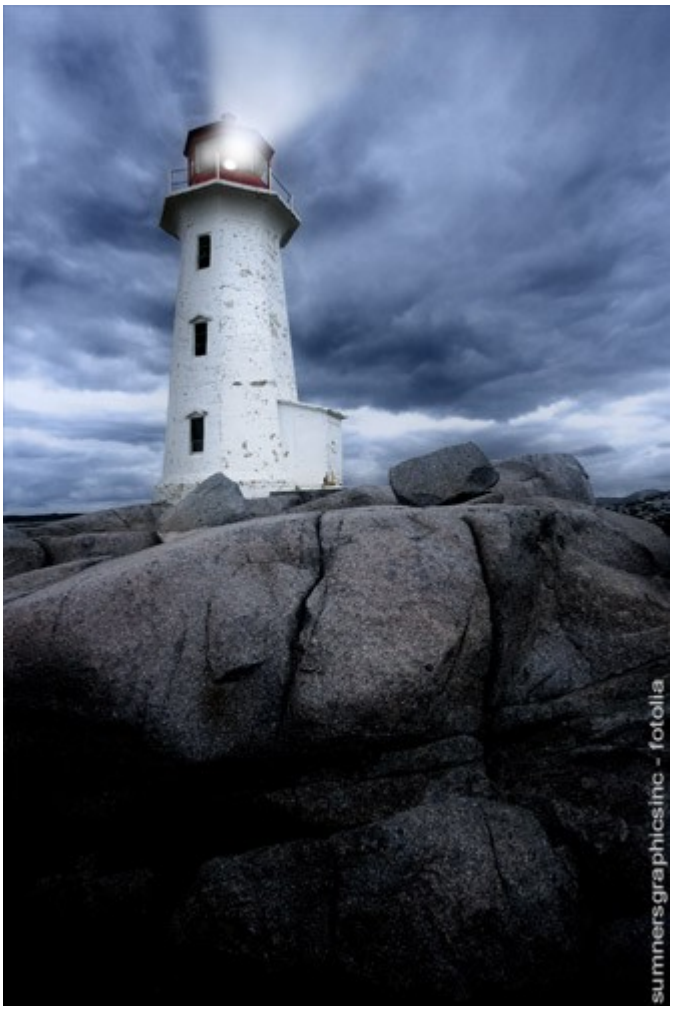
When purchasing a tripod, many photographers look for one that has a bubble level built in on the tripod. Keep in mind that this bubble level will be almost useless to photographers, because even though the tripod may be level, the ballhead mounted thereon could be off center. The only use for a tripod bubble level is to make sure the legs are all even. However, having a bubble level on the ballhead is extremely useful to make sure that the horizon in the image is straight when shooting at night when it is impossible to see if it is straight in the horizon.

More important than a solid tripod is a solid ballhead. Night photography poses special problems for ballheads, because of ballhead creep. Creep is what happens when a ballhead very slowly falls lower and lower over an extended period of time. Many ballheads which appear to be solid will slowly slide downward over a period of an hour or more when a heavy camera or lens is used. Ballheads are rated according to the maximum weight they can support. As a general rule,

choose a tripod and ballhead that advertises the capacity to hold a camera that weighs three times more than the gear you will use. For example, if the camera and lens you will use weighs 6 pounds, it is advisable to purchase a tripod and ballhead that advertises supporting a maximum capacity of 18 pounds.

While the world of tripods and ballheads always involves new and better products, I can safely recommend that, in my opinion, the best ballhead under $200 is the Vanguard SBH-300. This ballhead sells for only $100 and is easily better than many ballheads that cost three times that price. And no, I'm not being paid to say that.

* * * * *



Chapter Twelve: HDR Night Photography

Night photos always impact viewers of photography because the lighting is out of the ordinary—creating visual interest. I rarely see a night photo that doesn't immediately convey some type of mood. This is compounded when the HDR technique is used.

HDR night photography creates several technical problems for photographers to overcome. The first problem is that many night scenes do not have high-contrast lighting. This means that the HDR process will generally not have quite as much impact as it would otherwise. Photographers can easily overcome this issue by including the light source in their HDR night photography. Often the light source will be the moon, but the landscape may also be illuminated by streetlights or stars. Simply including the light source in the image will transform an average HDR into a beautiful photo by putting more emphasis on the dynamic range in the scene.

With the light source included in the HDR, photographers commonly make the mistake of failing to include the full dynamic range in the exposure bracketing sequence. No time is more important than night time to check the histogram. Suppose you're photographing a cityscape at night. Because photographers generally choose a long exposure at night and simply bracket the shots by two stops, there usually isn't a shot that is dark enough to correctly expose the street lights in the cityscape. In post-processing, the HDR software tries to make sense of the blown-out highlights and then blends them in with the rest of the photo, but generally cannot do so properly. This results in what some HDR photographers call "plasma burns" on the light sources.

The first way to mitigate these plasma burns is to simply cover the entire dynamic range with the exposure bracketing sequence. The second is simply to mask in one of the single shots into the final HDR photo to cover up the plasma burns. While it is important to cover the lower end of the dynamic range in the exposure bracketing sequence, it is even more important to cover the upper end.

The number one most common mistake I see in night landscapes is that the photographer became impatient and did not expose the scene for a sufficient amount of time. Night images do not have to, and generally should not, look overly dark. Remember, the quality of light is what makes a night landscape beautiful—not the lack of light. Further, this makes night landscapes

more amenable to HDR because it allows the camera to capture all of the detail present in the scene. HDR is about sucking in all of the information in a scene. The information in the landscape often includes tiny details such as stars. Applying too strong of an HDR effect to a landscape with stars usually produces dark haloing around each little star when viewed close-up. The haloing can be mitigated by reducing the threshold setting (discussed in a later chapter).

There is one natural "halo" that you might want to keep. When shooting night moonscapes, taking one of the bracketed shots far brighter than normal will result in a ring of light around the moon. Some night photographers do not like the light around the moon to show and prefer the moon to be a perfect circle with stark black immediately surrounding it. This is largely a matter of taste, but advanced photographers should be aware of this option.

In addition to haloing, noise is a difficult problem for night photographers. Noise shows up more prominently when placed on a dark background, and the HDR processing always increases the noise levels in the scene. The key to mitigating noise is to ensure that the dark shot has enough information in the shadows. Remembering the chapter on exposure, the dark shot needs enough light levels for the shadows to record them accurately for there to be less noise in the image. Another way to reduce noise is to run each image through noise reductions software before processing the HDR.

* * * * *

Copyright Notice and Legal Disclaimer

Jim Harmer

emailharmer@gmail.com